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REMOTE STORAGE

THIRD ANNUAL REPORT

OF THE

REMOTE STORAGE

COMMISSIONER

OF

PUBLIC ROADS

For the Year Ending October 31st,

1896.

STATE HISTORICAL SOCIETY
OF WISCONSIN
MADISON, WIS.

TRENTON N. J
MacCrellish & Quigley, State Printers, Opposite Post Office.
1896.

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OFFICE OF COMMISSIONER OF PUBLIC ROADS,
TRENTON, N. J., November 30th, 1896.

To the Governor and Legislature of New Jersey:

Complying with the Acts of different Legislatures, I have the pleasure of presenting the following report of roads constructed under the State Aid Law, for the fiscal year ending October 31st, 1896, with such items concerning the development of the improved road system as may be of interest to the public.

HENRY I. BUDD,
Commissioner of Public Roads.

STATE HISTORICAL SOCIETY
OF WISCONSIN
MADISON, - WIS.

P1894-3

REPORT.

In compliance with the Act of June 15th, 1896, we make the following report of such roads as the statement of costs have been furnished us on or before October 31st, 1896.

The following claim this year's State appropriation:

ATLANTIC COUNTY.

Hammonton and Absecon gravel road	12 miles
Cost	$16,204 77
State's share	5,401 59

BURLINGTON COUNTY.

Mt. Holly and Pemberton	6 miles
Cost	$35,313 33
State's share	11,771 11
Burlington and Bridgeboro	4 $\frac{5}{12}$ miles
Cost	$25,552 05
State's share	8,517 35
Palmyra and West Palmyra	$\frac{3}{5}$ miles
Cost	$3,741 45
State's share	1,247 15

ESSEX COUNTY.

Second Mountain, Northfield and Budd's Lane Bridge road	6 miles
Cost	$28,027 23
State's share	9,342 41

GLOUCESTER COUNTY.

Westville and Glassboro road	6 miles
Cost	$30,736 65
State's share	10,245 55

MERCER COUNTY.

Pennington and Hopewell	$4\frac{1}{2}$ miles
Cost	$37,996 32
State's share	12,665 44
Mercerville and Edinburgh	$4\frac{2}{10}$ miles
Cost	$41,149 95
State's share	13,716 65
Greenwood avenue and Chambers street	$2\frac{1}{4}$ miles
Cost	$24,107 52
State's share	8,035 84

MIDDLESEX COUNTY.

Spotswood and Old Bridge road	3 miles
Cost	$12,523 53
State's share	4,174 51
Stelton and Dunnellen road	6 miles
Cost	$32,140 23
State's share	10,713 41

MONMOUTH COUNTY.

Englishtown and Manalapan road—Bog iron ore	$3\frac{3}{4}$ miles
Cost	$7,599 99
State's share	2,533 33

SALEM COUNTY.

Pointers and Canal Bridge road	$2\frac{2}{3}$ miles
Cost	$4,906 98
State's share	1,635 66
Total cost to the State	$100,000 00
Appropriation	100,000 00

Total cost of roads to both State and county are given further on in the more detailed statements of engineers and supervisors. The following roads have been approved and are being placed under contract for construction under the State appropriation for the fiscal year beginning November 1st, 1896, and ending October 31st, 1897:

ATLANTIC COUNTY.

Hammonton and Absecon road – Gravel. Hammonton end..... 10 miles

BURLINGTON COUNTY.

Columbus and Bordentown road—Stone	5	miles.
Florence Station to Florence—Stone and slag	$2\frac{1}{2}$	"
Charleston road to Rancocas turnpike—Stone	4,259	feet
Pensauken creek to West Palmyra—Stone	3,570	"

CAMDEN COUNTY.

Berlin and Hammonton road—Gravel	12	miles

ESSEX COUNTY.

Mountain Avenue road—Stone	1	mile
South Orange Avenue road—Stone	$3\frac{2}{3}$	miles

MERCER COUNTY.

Pennington and Lawrenceville road—Stone	$4\frac{3}{4}$	miles
Hutchinson Mill road—Stone	1	"

MIDDLESEX COUNTY.

Perth Amboy and Metuchen road—Stone	$4\frac{3}{4}$	miles

MORRIS COUNTY.

Long Hill road—Stone	$2\frac{1}{2}$	miles
Kenvil road—Stone	$1\frac{3}{5}$	"
Succasunna road—Stone	$1\frac{1}{5}$	"
Chatham and Passaic river road—Stone	$1\frac{1}{2}$	"

MONMOUTH COUNTY.

Long Branch and Asbury Park road—Stone and gravel	5	miles
Perrineville road—Bog ore	$3\frac{3}{5}$	"

PASSAIC COUNTY.

Echo Lake road—Stone	$2\frac{2}{5}$	miles
Little Falls road—Stone	$1\frac{1}{2}$	"
Rea avenue—Stone	$\frac{4}{5}$	"

SOMERSET COUNTY.

Somerville and Bound Brook road—Stone	4	miles
Mountain avenue road—Stone	2	"
Total	$70\frac{25}{28}\frac{49}{80}$	miles

The Public Roads.

The State Aid Law has stimulated the property-holders of many counties in New Jersey to spend hundreds of thousands of dollars upon their roads to meet the State appropriation. The result is shown in the possession of many improved highways connecting our principal towns and cities.

Under this law the State paid in 1892, $20,661.85; in 1893, $71,237.22; in 1894, $74,696.83; in 1895, $100,000; in 1896, $100,000; its appropriation for 1897 is $100,000, making a total of $466,595.10, which, added to the amount which counties and individuals are required to spend to obtain the State appropriation, aggregates in six years, for permanent roads in New Jersey, over $1,400,000, making a total of about 300 miles constructed and contracted for under the State law. Many more miles are applied for, and petitions for other roads are being continually filed, showing the demands for good roads to be so great that people are willing to subject themselves to increased taxation, necessary to meet the requirements of the State Aid Law.

For the year 1897, on account of many miles in the lower portion of the State being of cheaper construction, (of gravel, bog ore, and oyster shells), the mileage contracted for will be somewhere in the neighborhood of 100 miles, double that of any previous year. By June of 1897, there will be a continuous improved highway from Atlantic City to and through Camden, to Burlington and Mount Holly.

Links are being constructed which will form a continuous chain from Atlantic City through Camden, Mount Holly, Columbus, Bordentown, Trenton, Princeton, New Brunswick, Elizabeth, and Newark to Jersey City; other roads already built, and building, serving as feeders to this great highway, and branches to the outlying towns and cities.

Nearly all the cities and towns of any importance now have improved roads diverging in many directions through the surrounding

Teams on Vincentown and Camden Stone Road on their way to Philadelphia Market, Burlington and Camden Counties, New Jersey.

country. These improved highways give new life to the country through which they pass, as they are often thronged with bicycles and other vehicles, which, easily and pleasurably, carry their weight of freight and passengers to and from the leading trade centres.

In the early history of the Road Law, Burlington, Camden, Gloucester, Mercer and Middlesex counties were the only applicants for State aid; now, Atlantic, Essex, Morris, Monmouth, Passaic, Somerset, and Salem counties have been added to the ever-increasing list, making the share of the appropriation for each too small for the wants of their enterprising citizens.

Atlantic county, in 1896 and 1897, opens a new era in our road building; she presents the first road in the State, constructed under the State Aid Law, out of any other material than stone. Twenty-two miles of gravel are being built from Absecon to Hammonton.

Camden county is also to build twelve miles of gravel to connect with this.

Monmouth county is building a road of bog ore four miles long.

Salem county is building a road of oyster shells three miles long.

Burlington county is building a road of stone two and a half miles long, with slag foundation.

The remaining portion of the 100 miles will be of macadam and stone construction.

The great number of roads that are, and have been, petitioned for, will require a largely increased State appropriation in order that they may be constructed in a reasonable time.

The advantages of these roads are so apparent as object lessons that the limited enjoyment of them rapidly increases the appetite for more.

Good Roads—

"Decrease taxation;
Decrease living expenses;
Increase property values;
Increase farmers' incomes;
Increase railroad business;
Promote prosperty;
Promote civilization."

Description of Roads Improved in 1896.

ATLANTIC COUNTY.

Hammonton and Absecon Road, Twenty-two Miles Long.

Three sections of this road are completed through a region that is rapidly developing. Quite a population has gathered in the towns of Pomona, Egg Harbor City, DaCosta and Hammonton, and on their surrounding farms. This will be, as part of a line from Camden to Atlantic City, one of the best traveled roads of the State. Gravel is the material of which this road is constructed.

The maximum grade is about one foot to a hundred.

The cost of three sections will be $16,204.79.

BURLINGTON COUNTY.

South Road, from Mount Holly to Pemberton.

This, the main road from Mount Holly to Pemberton, is six miles long. It runs through a rich, alluvial, sandy loam, farming country, along the edge of a sandy ridge, with some of the finest farms in the State spreading for several miles to the south of it. The old bed was principally a heavy body of sand, which made it difficult the most of the year for ordinary travel. The construction of it commenced in the early spring, and was finished in October of this year. The manner of building five miles was a 6-inch telford bottom, 8 feet wide, covered with macadam 4 inches deep, with macadam wings 6 inches thick extending 3 feet each side of the telford, making a finished roadway when done 14 feet wide. One mile was made of pure macadam, for comparison of endurance with telford, 10 inches deep, 8 feet wide in the center, 3 feet wide each side, 6 inches thick, making a 14-foot macadam road for one mile. It now presents a great contrast to the heavy sand bed over which the inhabitants have traveled for two centuries. All who use it, even those who have to pay the 10 per cent.

of its cost, are intensely pleased with it. It affords a very fine driveway for pleasure carriages and bicycles, also a firm roadway for heavy draft wagons. A great deal of hay, straw and other heavy produce is carted over it, towards the towns and cities along the Delawarer river.

The maximum grade is one and one-half feet to the hundred.

The cost of the construction is $38,061.48, and is one of the best investments the State and county has ever made.

Burlington and Bridgeboro Road.

This extends from the city of Burlington to the village of Bridgeboro, 4 ^{5} miles, connecting there with a system of macadam roads already built, enabling the people in Burlington and the residents along the line to travel on stone roads all the way to the city of Camden.

The road is constructed upon a very heavy sand foundation, and is a vast improvement over the gravel which had been several times worn into the sand by the heavy traffic necessary to move to market the vegetables and fruits, which are mainly raised along and adjacent to the line.

The grading on this was slight. The construction is a telford bottom six inches deep, with a macadam surface five inches thick, making a thickness of cross-section of eleven inches, fourteen feet wide.

The maximum grade is three inches to the hundred feet.

The cost of this road was $28,346.92.

Palmyra and West Palmyra Road.

This was the third road built this year, and is three-fifths of a mile long. It rests upon a sandy foundation and connects the two Palmyras, and will form, with the extension, when completed the coming year, a road to the Pansauken creek, the dividing line between Camden and Burlington counties, there uniting the improved roads of Camden and Burlington counties. This allows bicycles, carriages, and loaded teams of the farming and truck lands for miles around to pass over a macadam road without break, all the way to the cities of Camden and Philadelphia, or to the different landings along the creeks and river.

This road is also of 10-inch macadam and telford construction (6 inches of telford, 4 inches of macadam), four feet wide, and cost $3,650.30.

The maximum grade is 3½ inches to the hundred feet.

ESSEX COUNTY.

Northfield Road.

This road, 2½ miles long, extends from the Montclair Basin, between the First and Second Mountain, up to and across the Second Mountain, to and over the meadow and farm lands of Livingston township, to the town of Northfield. The surface upon which this is built is composed of clay and boulders; the county around is of a glacier drift formation, millions of boulders covering the surface. In the construction of the road the boulders were turned into the trench, broken up and thoroughly wedged to the depth of five and six inches for the telford foundation; over this a covering of ledge trap rock, 1½ inches in size, was spread to the depth of three inches. Upon this road there were heavy grades, cuts and fills, one requiring a cut from 11 to 15 feet through the top of the Second Mountain. This, in connection with the macadam road, which runs to the inclined plane at South Orange, gives the farmers of this section an easy access to the Oranges, placing an isolated community in free and easy communication with the markets of Newark and Orange.

The Northfield and Budd's Lane Bridge road, 3½ miles long, is a continuation of the above; it is built through one of the best farming sections of Essex county, over a clay and boulder bottom, which, at certain seasons of the year, has been almost impassable. The construction has been the same as the first; boulders in the bottom for the telford, and three inches of 1½-inch crushed rock for the surfacing. This, like the first, was very expensive to grade.

These, when completed, will form a connection with the Morris county system, which leads from the Passaic river to the town of Chatham, thus enabling the farmers to cart their material over easy grades and the best of roads to and from the Delaware and Lackawanna railroad. This also joins with the South Orange road, which is to be built next year, giving this isolated section three fine outlets to the Oranges, Newark and Delaware and Lackawanna railroad at

Chatham, and will thus invite investment and residence for city people in a very picturesque country.

The maximum grade is 6 per cent.

The cost of both sections will be $28,027.24.

GLOUCESTER COUNTY.

Westville and Glassboro Road.

This road, 11½ miles long, six of which were constructed this year, passes over and through an alluvial, sandy, and sandy loam country, the roads of which, at most seasons of the year, are almost impassable from the depth of sand. There is a large amount of truck and fruit growing along its line, which has, before this year, been forced to make a long detour in order to reach a gravel road to move towards the Philadelphia markets. The final construction of this road to Glassboro will give to a large section easy access to the markets of Philadelphia and Camden. This road is 10 feet wide with a telford bottom of 6 inches and a macadam superstructure of 4 inches; the whole cross-section 10 inches deep, with a shoulder 7 feet wide of clay and gravel to the ditch line. The grading along this road was comparatively light, and formed but a small part of the cost of the construction.

The maximum grade is 2 per cent.

The cost is $31,880.89.

MIDDLESEX COUNTY.

Dunellen and Stelton Road, Six Miles Long.

This road leads from beyond the Pennsylvania railroad, at Stelton, through and over a red-shale formation to a short distance beyond the Lehigh Valley railroad near Dunellen.

Its course is over a surface almost impassable in winter, but will now afford the farmers a constant and easy transit, in connection with other macadam roads, to the markets of New Brunswick, Plainfield, Elizabeth and Newark. On each side of this road, some very fine farms are located, the owners of which now, when they desire to move either for pleasure or business, can go irrespective of the bad condi-

tions of weather. This road is of macadam construction, 14 feet wide and 8 inches deep; 4 inches of ballast stone in the bottom, 4 inches of $1\frac{1}{2}$-inch macadam on the surface. It now presents a firm and smooth roadway, which promises to be hard and convenient for travel at all seasons of the year. So well pleased are the inhabitants of that section they are applying for other improved roadways to connect with it.

The maximum grade is 3 per cent.

The cost of this road is $33,500.

Spotswood and Old Bridge Road, Nearly Three Miles Long.

This improvement extends from the village of Spotswood to the village of Old Bridge, through a very pretty farming region. The surface of the road and country ranges from a sandy to a sandy loam, but the ancient road-bed had become quite heavy with sand by the rain-fall of centuries, washing out the clay. The stone-bed is macadam 12 feet wide and 8 inches deep, composed of 4 inches of $2\frac{1}{2}$ and 3-inch ballast, this slightly covered with a clay binder and rolled; then upon this 4 inches of $1\frac{1}{2}$-inch stone was spread and thoroughly rolled to a finish with $\frac{3}{4}$-inch stone and screenings.

The maximum grade is $1\frac{1}{2}$ inches to the 100 feet.

MERCER COUNTY.

Pennington and Hopewell Road, Four and One-half Miles Long.

This road extends from the village of Pennington to the borough of Hopewell, through a fine farming country, which is alternately red shale and sandy loam. This roadway has been of expensive construction on account of deep cuts through tough shale rock and heavy filling over meadows bordering on rapid streams; fills and expensive bridges were necessary to raise the road-bed above and vent the floods that so quickly rise in this hilly section.

This roadway is 14 feet wide, and is mostly of a telford foundation; telford 8 inches thick, macadam 6 to 8 inches deep over the surface of the telford; where the road has been graded over the rock, 10 inches of macadam has been spread. On account of the latitude allowed the contractor by the Board of Freeholders, this road-bed has

received 2 to 4 inches more of stone than the traffic of the country absolutely necessitates. It, of course, will have more lasting, wearing qualities, but, in my judgment, 8 inches of macadam and 10 inches of telford would have been sufficient.

The maximum grade has been reduced from 10 to 5 per cent.

The cost of the road will be $45,620.72.

This road, when completed, will be part of the system extending from the city of Trenton through Pennington and Hopewell to the Somerset county line, where it will meet the improved roads of that county, giving the farmers communication with the cities and markets in either direction.

Lawrenceville and Princeton Road, Four and Three-quarter Miles Long.

This is a continuation of the Trenton and Lawrenceville road, and runs through a well-improved farming district, over sandy loam, boulder and shale soils.

This forms a very important link between the growing educational centers of Lawrenceville and Princeton, and will, in time, be part of a continuous improved road from Trenton, through Princeton and Millstone, to New Brunswick, connecting with the macadam system of the upper portion of the State. This has been an expensive road to build, on account of overcoming some of the steep gradients, and the extra filling and bridging over the heavy flood streams.

The construction of this has been telford and macadam; mostly telford foundation 8 inches deep, covered with macadam 4 inches deep, making the whole depth 12 inches. Upon this road the Freeholders have allowed considerable latitude to the contractor, which has resulted in a deeper and more expensive road than is absolutely necessary for the traffic. This road will not be completed this year, therefore will not claim the appropriation for the fiscal year ending October 31st.

The maximum grade is 6 per cent., reduced from 12 per cent.

The cost of the same will be about $50,000.

Mercerville and Edinburg Road, Four and Two-tenth Miles Long.

This commences at the Trenton and Mercerville gravel pike and extends in a northeasterly direction through a gravelly and sandy

loam deposit to the village of Edinburg. The principal part of the old road-bed was a heavy sand, through which the teams of the neighboring farmers for years passed with much difficulty, carting to the Trenton market. The completed roadway is 14 feet wide and from 12 to 14 inches thick, of telford and macadam construction. Telford 8 inches, crushed stone 4 to 6 inches, bonded together with loam and gravel, covered with stone screenings rolled to a resistant surface. This road is also an evidence of costly construction, where the Freeholders have allowed the contractor to exceed the limit of the specifications in making a deeper road-bed than is necessary for the traffic.

The maximum grade is 2 per cent.

The cost of the road is $49,741.01.

Chambers Street and Greenwood Avenue Extension, Two and one-quarter Miles.

Greenwood avenue forms a connecting-link between the vitrified brick pavement and telford road of Greenwood avenue that was constructed last year, forming a smooth, hard roadway from Clinton street, Trenton, to the Inter-State Fair grounds. Chambers street extension commences at East State street, and runs east at right angles across the Greenwood avenue road. This has also been an expensive road, on account of the heavy fills and deep, broad construction. In the contract this was to be 16 feet wide and 12 inches deep, of telford and macadam construction, but the Freeholders have allowed it to be built the whole width of the street, 30 to 40 feet.

This is part of the road which leads towards the White Horse, there to connect with the Burlington county system, which, when finished, will give a macadam roadway from the city of Trenton through Bordentown, Columbus and Mount Holly to the city of Camden, making a splendid driveway for bicycles and pleasure carriages, and an easy passage for the heavy market teams that move to the markets of Trenton from the rich agricultural districts that lie south and east of the city.

The maximum grade is 2 per cent.

The cost of this road about $40,000.

Cast Away.

A Common Experience on Country Roads.

MONMOUTH COUNTY.

Englishtown and Manalapan Road.

This road leads from the railroad station at Englishtown to the town of Manalapan, a distance of four miles, over a sandy loam soil, through an excellent farming region. The road was the bed of a worn-out gravel pike. The State and county are now covering it with a bed of bog iron ore mined from the adjacent and not far distant meadows. The finished roadway is 12 feet wide and 7 inches thick, placed on in two layers and thoroughly compacted with a heavy roller. This makes a very pretty roadway and is an experiment which, we hope, will prove sufficient for the traffic of this section, which is not so heavy as that near the large cities. Its cost, being so much less than the same depth of stone, will be sufficient warrant for its construction where this kind of material is easily accessible.

The maximum grade is 3 per cent.

Its cost is about $7,609, or $1,900 per mile.

SALEM COUNTY.

Pointers and Mannington Canal Bridge Road, About Three and Two-thirds Miles Long.

The bordering country is a very fine farming region, the land, sandy loam—clay predominating. This road is built of oyster shells, 10 feet wide and 12 inches thick.

This is also a new experiment in State and county road building. It makes a fine appearing road, but will not stand the heavy traffic that stone construction will. It may answer for this section, where the carting is not so heavy as near the large cities. If this construction proves to be eminently satisfactory, there will be other roads candidates for this class of improvement.

The maximum grade is one per cent.

Its cost is about $5,000, or about $1,375 per mile.

To consume the appropriation for 1897 the following roads have been contracted for, some of which are now under the process of improvement:

2 ROADS

ATLANTIC COUNTY.

Hammonton and Absecon Road, Twenty-two Miles Long, One Section Yet to Be Completed.

This road is being constructed of gravel; it passes over a sandy, pine region, through Pomona, Egg Harbor City, Elwood, DaCosta and Hammonton, growing towns in the New Jersey pines. This road forms part of a continuous line from Camden to Atlantic City. It will cost about $1,300 per mile.

BURLINGTON COUNTY.

There have been in Burlington county four roads contracted for: One from Columbus to Bordentown, five miles, to be built of stone, 8 inches macadam, 10 feet wide; one from Florence station on the Camden and Amboy railroad to the iron-pipe manufacturing town of Florence, two and one-half miles in length. It is to be of macadam, slag foundation, with a stone surface; one from Charleston to Rancocas turnpike, 4,259 feet, 8 inches macadam, 12 feet wide; another from Pensauken creek to West Palmyra station, 3,570 feet, 8 inches macadam, 12 feet wide.

These roads are mostly over a sandy loam surface through good farming sections, road-beds now worn-out and filled with a heavy bed of sand. They will be welcome additions to the many towns and farms along their lines.

One or two gravel roads are in contemplation, and may be constructed this year, if other counties do not claim all of their share of the State appropriation. There are many other roads applied for in this county which will have to wait for years for improvement, unless the State appropriation is increased.

CAMDEN COUNTY.

Berlin and Hammonton Road, Twelve Miles Long.

This road passes near the villages of Atco, Waterford, Ancora, Blue Anchor and Winslow, over a sandy loam farming section, and through a partly improved sandy and pine district. It forms the

last connecting link between the Camden and Berlin stone road and Atlantic City. This is also to be constructed of gravel obtained from the road bed and along its line. When completed, which will be early in June of '97, it will be part of the longest line—over 60 miles—of improved roads in the State, and will form a fine boulevard for bicycles and pleasure teams from the city of Philadelphia to Atlantic City. Over the upper and lower portion hundreds of loaded teams will pass each day, delivering the products of the farms to the great markets of Atlantic City, Camden and Philadelphia; it will be a part of the through system which we hope ere long will be completed through the State from Jersey City to Atlantic City.

ESSEX COUNTY.

There are two roads contracted for, one beginning at the Passaic county line and running south along the Mountain Avenue road, over one mile, which is to be of telford, 14 feet wide and 10 inches thick.

South Orange Avenue road, $3\frac{2}{3}$ miles; the width to be 12 feet and depth 8 inches, of telford macadam.

MERCER COUNTY.

Pennington and Lawrenceville road, now under construction; $4\frac{3}{4}$ miles long, macadam and telford, 12 inches thick and 14 feet wide.

Hutchinson mill road, 1 mile. Many other roads are petitioned for in this county.

MIDDLESEX COUNTY.

Perth Amboy and Metuchen road, $4\frac{3}{4}$ miles long, is contracted for, and is to be of macadam, 12 feet wide and 8 inches deep. This forms a connecting link between the Metuchen and New Brunswick macadam road and Perth Amboy, giving a continuous improved highway between the cities of New Brunswick and Perth Amboy.

The number of roads petitioned for in this county are legion.

MONMOUTH COUNTY.

Long Branch and Asbury Park road, 5 miles long, now being built.

It is to be of macadam and telford, 14 feet wide, $8\frac{1}{2}$ inches thick, gravel 6 feet wide each side, 5 inches thick. Total width, 26 feet.

Perrineville road, $3\frac{3}{5}$ miles long, to be built of bog ore, 12 feet wide and 6 inches thick.

MORRIS COUNTY.

Three roads are contracted for in this county.

Long Hill road, $2\frac{1}{2}$ miles, running across trap and sandstone ridges from Millington Station to Williams' Corner, in Passaic township.

Kenvil road, in Roxbury township, $1\frac{1}{3}$ miles long.

Succasunna road, in same township, $1\frac{1}{5}$ miles long.

Chatham and Passaic River road, $1\frac{1}{2}$ miles long.

All to be of macadam construction, 10 and 12 feet wide and 4 to 6 inches thick.

The last three, through alluvial farming lands, connecting the farming population with important railroad centers.

PASSAIC COUNTY.

Rea Avenue road, four-fifths of a mile long, is to be 4 inches in depth and 16 feet wide.

Little Falls road, $1\frac{1}{2}$ miles long, is to be 16 feet wide and 4 inches deep.

Echo Lake road, now under construction, 2.46 miles; macadam, 14 feet wide and 4 inches thick.

SOMERSET COUNTY.

Somerville and Bound Brook road, 4 miles long; macadam and telford construction; macadam, 16 feet wide, 8 inches thick. Mountain Avenue road, a distance of 2 miles; macadam and telford construction; 6 inches of telford and 4 inches of macadam, 10 inches thick.

Instructions to Freeholders, Engineers, Supervisors and Others Interested in Building and Repairing Roads.

In our system of rotation in office, the different counties so often change their freeholders and these their committees, that every year brings in many new incumbents who know but little of the proper manner of building stone or gravel roads; therefore, we embody some instructions that will, from the general distribution of our reports, easily become available to all the county officials, who, in the line of their duties, are now required to supervise the construction of many miles of improved highways.

There are so many points necessary to properly build, bond and preserve good roads, they cannot be too frequently emphasized; therefore, in order that they may claim frequent and general attention, we give space to the following, gathered from experience and from some of the best authorities on road building:

The hardest and toughest stone or rock procurable at a reasonable cost should be selected.

All stone should be as near cubical as possible, and none should be over $1\frac{1}{2}$ inches each way in diameter.

The earthen base should be thoroughly drained, the water taken out and kept out, then rolled until the roller ceases to make any impression on it, and made to conform to the same curvatures as the finished road-bed. There is no better base than dry, firm earth, not even a telford foundation. The metal should be spread at a uniform depth over the whole surface, then partially consolidated by rolling; then thoroughly watered before the roller, which wetting causes the pieces to glide more readily together and to be more firmly bonded without crushing. Any depressions caused by rolling, to be remedied by picking up with a pick and adding sufficient stone to bring the surface up to the poper level. For this purpose on macadam and telford roads a steam roller of ten or twelve tons weight is best suited and most economical.

For gravel or earth roads a horse roller of from six to ten tons is sufficient. If the metal is well rolled and compacted, the bed will be impervious to water, and the earth below will then be so dry it will not freeze, uplift and disintegrate the bed. Dry stone, gravel or earth does not readily compact; therefore, in the spring, after the frost is well out and the ground is moist, the whole surface should be rolled with a heavy roller. There is nothing which gives better returns for the money invested than free application of the roller to the surface.

During the dry season the roads should be frequently watered or covered with a *slight* coat of loamy gravel.

In short, a perfectly good road must have a firm and unyielding foundation, good drainage, a hard and compact surface free from all ruts, hollows or depressions, the surface neither too flat to allow water to stand, nor too convex to be inconvenient to the traffic, and free from loose stones.

The following rules, issued by the Road Improvement Association, of London, England, for the guidance of road masters in keeping macadam and telford roads in proper repair, are valuable and instructive:

1. Never allow a hollow, a rut or a puddle to remain on a road, but fill it up at once with chips from the stone heap.
2. Always use chips for patching and for all repairs during the summer season.
3. Never put fresh stones on the road if, by cross-picking and a thorough use of the rake, the surface can be made smooth and kept at the proper strength and section.
4. Remember that the rake is the most useful tool in your collection, and it should be kept at hand the whole year round.
5. Do not spread large patches of stone over the whole width of the road, but coat the middle or horse-track first, and when this has worn in, coat each of the sides in turn.
6. In moderately dry weather and on hard roads always pick up the old surface into ridges six inches apart, and remove all large and projecting stones before applying a new coating.
7. Never spread stones more than one stone deep, but add a second layer when the first has worn in, if one coat be not enough.
8. Never shoot stones on the road and crack them where they lie, or a smooth surface will be out of the question.
9. Never put a stone upon the road for repairing purposes that will not freely pass in every direction through a two-inch ring, and remember that smaller stones should be used for patching and all slight repairs.
10. Recollect that hard stones should be broken to finer gauge than soft, but that the two-inch guage is the largest that should be used under any circumstances where no steam roller is employed.

11. Never be without your ring gauge; remember Macadam's advice, that any stone you cannot easily put into your mouth should be broken smaller.

12. Use chips, if possible, for binding newly-laid stones together, and remember that road sweepings, horse droppings, sods or grass and other rubbish, when used for this purpose, will ruin the best road ever constructed.

13. Remember that water-worn or rounded stone should never be used upon steep gradients, or they will fail to bind together.

14. Never allow dust or mud to lie on the surface of the roads, for either of these will double the cost of maintenance.

15. Recollect that dust becomes mud at the first shower, and that mud forms a wet blanket, which will keep the road in a filthy condition for weeks at a time, instead of allowing it to dry in a few hours.

16. Remember that the middle of the road should always be a little higher than the sides, so that rain may run into the side gutters at once.

17. Never allow the water tables, gutters and ditches to clog up, but keep them clear the whole year through.

Every roadmaster and supervisor should cut these rules out and paste them in his every-day hat. To make a good road is one thing, and to keep it in good repair is quite another thing. The fine roads in Europe are the result of a splendid repair system, where every defect is promptly corrected before it has time to cause serious damage to the highway.

BRIDGES.

All bridges and trunks should be replaced with iron, terra cotta or stone. Those of small span with stone arches or iron pipe. Those of large span with stone abutments and iron superstructure.

All trunks from one to four feet in diameter should be iron pipe. Glazed terra cotta comes next, but it is not as durable on account of frost, which in time decomposes it.

In many parts of our State resort is still had to wood construction, with the result that in from five to ten years they have to be rebuilt. In short, stone, iron and condemned iron pipe are now so cheap there is little excuse, on the score of economy, for using perishable materials.

CAUTIONS.

The inhabitants of some counties in our State are infatuated with the idea that only roads of telford foundation are worth constructing. It seems difficult to convince them that earth of any kind, properly

drained and rolled, is the very best foundation for stone or any other material.

A century ago, 18 to 24 inches was considered necessary for heavy traffic; then reduced to 12 and 15 inches. Now, with the introduction of the heavy steam roller, 6 to 9 inches upon a good earth foundation is the rule. Eight inches properly laid and rolled upon a solid earth foundation, will sustain as heavy a load without depressing as 18 inches. Experience has taught that a traffic-worn macadam road will stand up when only three or four inches thick. It is therefore demonstrated that where wise economy is necessary, 4 to 10 inches is sufficient, according to location and foundation. When traffic wears this to the point of disintegrating, apply new material. To build 12 to 14 inches thick is simply to bury so much stone and money that will avail nothing to this generation. On the one hand there is a desire for a road that will not cost much; on the other hand, insistence that the specifications shall be from 10 to 14 inches deep and from 14 to 16 feet wide. Now, cheap construction with stone cannot come with any such depths or widths; therefore, the smallest depth and width, consistent with strength and service, should be adopted.

The experience of the northern counties is that 4 inches of macadam on a well-drained surface answers most of their requirements, and 6 inches is the maximum they desire. From this they get as much wear as from the 12-inch telford, before re-surfacing is necessary. In our middle counties they have been building of 8-inch macadam, and will have no greater depth. But in our lower counties, where the soil is dryer, and presents a more desirable foundation than the northern and middle counties, the petitioners insist on roads 10 to 14 inches in depth, making the cost so great the taxpayers are appalled.

In one of our counties the freeholders have not paid any heed to the letter or spirit of the specifications, but have allowed them width and depth beyond that named, placing the maximum of thickness of metal where the minimum was intended, and would have been all-sufficient.

The lesson learned is that no specifications in the future will be signed except those in which one width and depth is plainly stated, and the State will not now, nor in the hereafter, pay more than one-third of the cost along these lines. All violation of the intent or letter of the specifications unnecessarily increases the burdens of the

Plate 3.—Effect of Narrow Tires on an Undrained Road.

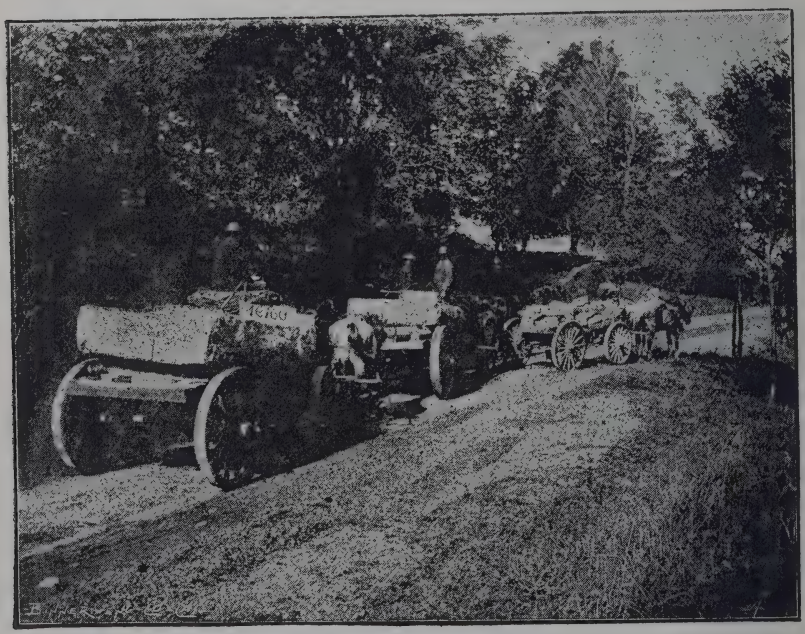

Plate 4.—Hauling Stone on Wide Tires.

petitioners and taxpayers, and tends to bring the State Aid Law into discredit.

LIMITATIONS OF THE STATE AID ROAD LAW.

The genius of our State Aid Road Law is that there are two contracting parties—the State and the county—concerned in their construction. The provisions are such that after the Freeholders have ordered the specifications to be prepared, they are to be approved or rejected by them. If approved by them, they are submitted to the State Commissioner of Public Roads for his approval or rejection. Then it is his duty to consider what the cost of the construction of the same is; and if he finds that the estimated cost, together with the cost of other roads of which he has approved in other portions of the State, shall not exceed the sum of $300,000, then, in that event, he may approve of the same; however, taking into view that the amounts paid out of the State treasury under the provisions of this act shall in each year be distributed among the several counties of the State in such manner as to the said State Commissioner of Public Roads shall seem fair and equitable. Now, after the approval of both parties, bids for the construction of the same are invited. The lowest bid, if responsible, is supposed to receive the contract. On the strength of these different approvals and the estimates made upon the bids, the sum awarded by the State is always or nearly mortgaged at the beginning of the constructive year, a slight allowance being made for a few unforeseen conditions which may make the roads a trifle more costly. In making these estimates, a standard of width and depth is given, to which, in all the parlance of engineering, the road is to be conformed. Bids are always invited on extra inches in depth, but it is never intended that this provision shall be interpreted by any of the contracting parties to allow of the adding of several inches additional depth to the whole road, thus enormously increasing the cost. The money has been appropriated by the State sufficient to build a certain depth and width of roadway. Therefore, when one of the contracting parties adds several inches in depth and many feet in width, and supposes that a fixed appropriation can be made to meet double the intended cost, there is shown a go-as-you-please style, an ignorance of the first principles of business, or a belief in Aladdin's ring; rub the same and the genii appearing will cause the currents to flow in sufficient volume to pave the streets with gold. The insertion in every

specification of privilege to bid for additional inches, is a provision to provide for bad places that may be encountered in the construction of the road, and, in general experience, only finds application to very limited areas. To take advantage of it and to spread it over the whole construction, is a gross violation of the letter and spirit of the specifications; and if done by one of the contracting parties without the written consent of both, is illegal and void.

The experience of the past year in one of our counties, whereby the letter of the specifications was disregarded and the cost of the roads thereby made much greater than they would have been under the rule practiced in the balance of the counties, of positively adhering to the width and the minimum instead of the maximum depth allowed, has taught the lesson that in the future only specifications with one fixed figure of width and depth should be approved, with the proviso that any alteration shall be made only by the written consent of the authorities of county and State. By this plan the officers of the counties will not be deluded with the idea that they can obtain from the State one-third of all their expenditures, no matter how extravagant they may be, and so prevent one of the wisest laws that has ever been passed for the development of the State from being cast into disrepute.

WIDE TIRES.

There are already two laws upon our statute book with reference to wide tires. The prevalence of improved roads in so many of our districts makes it necessary that we should seek every measure to prevent their destruction. We have, therefore, urged upon all the municipalities of the State to pass ordinances offering, under these laws, rebates, or imposing penalties for the failure to adopt wide tires, but there seems to be a delicacy on the part of these authorities to adopt any forcible measures, or a false idea of economy prevails that it would be a waste of money to offer a bounty for the widening of tires.

I would, therefore, suggest that a new statute be enacted, covering the whole State, by which municipalities would be required to pass an ordinance along the lines recommended by J. J. Albertson, Civil Engineer, as follows:

Rebates from the tax of the owner changing his wagon to a 4-inch tread; ten dollars for the year 1897; eight dollars, under the same

conditions, for 1898; six dollars for 1899; four dollars for 1900; two dollars for 1901, and no rebate after that, but a compulsory provision, with a fine, for all those that have not accepted the provisions of the act. It is useless and extravagant to build these expensive roads, then plow them up with heavily loaded, narrow-tread wagons.

The present laws authorizing the passage of such ordinances are faulty in construction, and leave an opening for appeal and litigation. Municipalities, while approving of them, deem it unadvisable to act under them. All European countries with improved roads have wise laws regulating the width of tires used on wagons, carts and vehicles for heavy draft. Experience demonstrates that broad tires are very much preferable for drawing loads through fields and on farm roads, as they sink less deeply into the soft earth and require less draught to move them. Where used, there will be no rutted roads, and the earth will be rolled and smoothed by them. Narrow tires tear up, while broad tires consolidate.

BICYCLES.

Were there no other reasons for the rapid improvement of our common roads, the argument of the greatest good to the largest number would apply to the benefiting of our immense army of wheelmen, to which recruits from all classes, by the thousands, are yearly being rapidly added. They can be seen, during a large portion of the year, speeding it over our improved highways, by means of which they are enabled, not only to maintain health, but to enjoy our beautiful and varied scenery so cheaply that traveling is no longer only the province of the rich. To demonstrate the increase in the number of bicycle riders, it will only be necessary to cite the progress of the cycle industry. Prior to 1885, the number of domestic manufacturers of wheels was only six; in that year 11,000 machines were turned out; in 1890 there were 17 factories with an output of 40,000 wheels; in 1894 the factories increased rapidly, and 125,000 machines were turned out; in 1895 the production was 600,000, and the number of factories more than 500, none of which turned out less than 1,000 wheels a year. The capital invested in these large factories is $90,000,000, and the estimate of the output for the present is not less than 1,000,000 wheels, valued at $60,000,000. What better argument for the speedy improvement of our roads than the necessity of affording easy passage for this immense number of vehicles?

The citation of these facts easily demonstrates that our average legislator cannot more easily attain political success than by ministering to the desires of this immense constituency.

FREE MAIL DELIVERY.

In our last report reference was made to the probability that horseless carriages would soon be an important factor in demanding that our roads should be speedily improved. This is being demonstrated by the actual fact that our post-office department is preparing horseless carriages for free mail delivery in our cities. With improved roads through our country districts, these carriages will quickly solve the problem of rural mail delivery, and thus help to destroy the isolation and distance from neighbors to which our country people are now subjected. So the forces of nature are coming in to counteract the mischievous tendency of population to aggregate in cities, on account of the social advantages there enjoyed, by quickly and easily conveying them all the elements that destroy isolation, and thus spreading and maintaining the population where nature designed it should rest. In European countries where improved roads are the rule, thousands of these horseless carriages are now being manufactured, and the prospects are they will soon become the rule rather than the exception; then when our roads are thus traversed they will not, as do the feet of horses and the tires of wagons, disintegrate them, but their rubber tires will smooth and make them more solid, so that when once we have provided a smooth pathway, expense for maintenance will be reduced to a very small amount.

STEEL TRACKS FOR HIGHWAYS.

In our annual report for last year, we said: "As all progress should be along the best lines, and as some of the best authorities predict the coming highways will be of steel, it would be well for New Jersey, as she is the pioneer in State Aid Road Improvement, to take the lead in inaugurating a system of steel-track roads, and thus ascertain by actual experience whether it is the most efficient and economical highway."

During the past year this part of our report has been copied and commented on by the leading papers in the United States, therefore

we have been in receipt of many letters asking where a sample of the road could be seen. These letters indicate that, had there been a sample of such road in the State, delegations and individuals from all over the Union would have visited it for inspection. The interest in steel-track highways has been increased by favorable discussion; in fact, we have not seen a single adverse criticism, although there has been a divergence of views on details.

General Roy Stone, Chief of the Road Department at Washington, in addresses and interviews, has emphatically endorsed steel tracks as the coming wagon-road.

In some of our invitations for bids during the year, we made provisions by which the numerous patentees for the different forms of wagon rail could construct a mile of the same, under the provision of our law which allows the construction of a macadam, telford or other stone road, or a road of gravel, oyster shells or *other good material*, but we failed to receive but one bid, and this under conditions which precluded its construction. If our inventors could be persuaded to construct some experimental lines which would be object-lessons, we might be able to inaugurate this form of construction. Our people are slow to adopt anything that does not present its advantages by practical illustration. I am, however, of the opinion that the coming year will give us model steel tracks in many States of the Union, and the Road Department of the General Government intends building experimental pieces of hard roads. They may construct a model track at Washington, where the representatives of the nation can see it; then, if the great advantages claimed for this form of road are justified, an impetus to its construction would be given in every State in the Union.

COST OF A STEEL-TRACK ROAD.

The opinion is often expressed that a steel-track road will cost but little more than a macadam. The steel track would seem to be an additional expense, but the saving in annual repairs and its greater durability may, in the long run, make it the most economical, as increased loads can be drawn and wear and tear lessened on vehicles.

Such a system connecting counties and States would be a wonderful advance in road-building, and would furnish a smooth pathway for the coming horseless motors, already in use in our large cities, and which promise in the near future to be in common use.

I renew my recommendations of last year, to wit, that the State authorize the construction of an experimental steel-track road.

TOLL ROADS.

There are in the vicinity of Camden about forty miles of stone roads that are owned by corporations, the tax upon which, to many farmers, amounts to from fifty to one hundred and fifty dollars per year. Many of these farmers are forced to pay not only this tax, but the tax for county roads that are built in opposition to them. There should be some equitable plan devised by which these roads could be placed in the same category as the State and county roads.

OYSTER SHELLS, GRAVEL, BOG ORE AND OTHER GOOD MATERIAL.

In the inception of the Stone Road Law, the only idea that occupied the minds of its originators was the building of permanent roads of stone only, but the friends of gravel and shell succeeded in ingrafting a provision for building with other good materials, therefore we have, during this year, approved of specifications for the following:

A road in Atlantic county, 22 miles long, of gravel; one in Salem county, 3 miles long, of oyster shells; one in Monmouth county, 4 miles long, of bog ore. The probability is that another, of gravel, 12 miles long, will be built in Camden county during 1897. Specifications have been made for quite a number of gravel roads in Burlington county, passing through its pine districts, allowing the fertile areas contained therein to pass their productions over the sand to the markets lying outside.

ROAD BUILDING IN OUR COMMON SCHOOLS.

There has been a movement on the part of the road inquiry section of the Department of Agriculture to persuade the giving of instruction in our common schools on road building.

There is strong need in this country of elementary instruction in this direction. The ignorance that prevails among the average rural residents regarding the proper manner of repairing even the common roads, shows a striking necessity for some kind of technical instruction, guided by which our ordinary township authorities will be able

to make the best use of the ever-present materials for keeping the roads in proper repair. In traveling over our country, we often see them repairing a miry roadway by throwing mud from the ditches into the middle of the road-bed. In all our communities it is a common practice to scrape the worn-out material, that has been repeatedly washed from the center of the road, back into the middle of the road, only to be again washed out by the rain or to be waded through as deep sand. Upon our macadam highways we find a prevailing spirit of neglect; instead of immediately repairing the little breaks, our county officials leave them until rods of the stone become unravelled, necessitating, at times, the expenditure of several hundred dollars per mile for repairs, where a few dollars would have been sufficient.

If our youth were thoroughly educated and interested in the details of good road building, they, as our future guardians, would be fully alive to the importance of using the proper materials, at certain times of the year, for their most economical improvement. The material prosperity of our Commonwealth is so dependent upon the condition of our common wagon roads, that the manner of their improvement should be early impressed upon our future governors, who now represent the youth of the land.

IMPROVED ROAD ASSOCIATIONS.

As it will be a long while before the 20,000 miles of roads in this State will be improved either by Township act, County or State acts, it will be necessary for other means to be temporarily inaugurated. In many portions of the country good-road leagues and associations have been and are being formed. By means of these, through the agitation which they induce, they have been enabled to persuade money and labor from their communities, with which they have been instrumental in improving many miles of roads in their respective localities. Of course, they do not accomplish the expensive and permanent road construction that is being done under the different Township, County and State acts, but they cultivate a sentiment so impressive that every citizen coming under its influence is induced to contribute a portion of his labor and means to work independently with or to assist their towns or townships. Under their stimulus many roadways have been not only improved, but their sides have been beautified

by trees and other shrubbery. Foot-paths and cycle-paths have been created, and the appearance of their respective communities have been so changed they have become attractive centers of settlement alike for young and old.

Too much stress cannot be laid upon the importance of these associations. There is no power so useful as that which persuades each and every person or community to do their best to help themselves by their own labor and contributions. There is a woeful lack of knowledge of even the simplest forms of road construction and repair among many upon whom this work has devolved. In almost every community there is a variety of material which, with proper knowledge, can be combined so as to make passable roads for a great portion of the year. The education these associations give their members is sufficient to teach them how to properly form the road-beds now under their control, so that instead of being sloughs from which every passing wheel throws out and carries away great quantities of the road-bed, they would be pleasant and smooth earth-roads over which the same vehicles would pleasantly pass.

They should be educated along the lines of draining and preventing earth and water from mixing on the road-bed, also taught how a proper admixture of suitable earth materials, clay, sand and gravel, in the proper proportions will make an impervious roofing and form a perfect roadway for light traffic. In many sections the shales and slates that abound would, if used, make a very passable roadway. Along the seashore shells can often be cheaply obtained. These form a very pretty road for light traffic. Road associations would educate people along all these lines and thus hasten the day when our State will be a model to other communities, and become so attractive the surplus population of our neighboring cities will be induced to settle within her borders.

ADDITIONAL APPROPRIATION.

The fear of increased taxation that so generally prevails among farmers is rapidly giving way to an intense desire that they shall be sooner benefited than the limited appropriation of the State now allows.

The education that is being given in our different communities by the object-lessons the State Aid Law is continually creating, is intensifying the feeling, among those whose petitions have been on

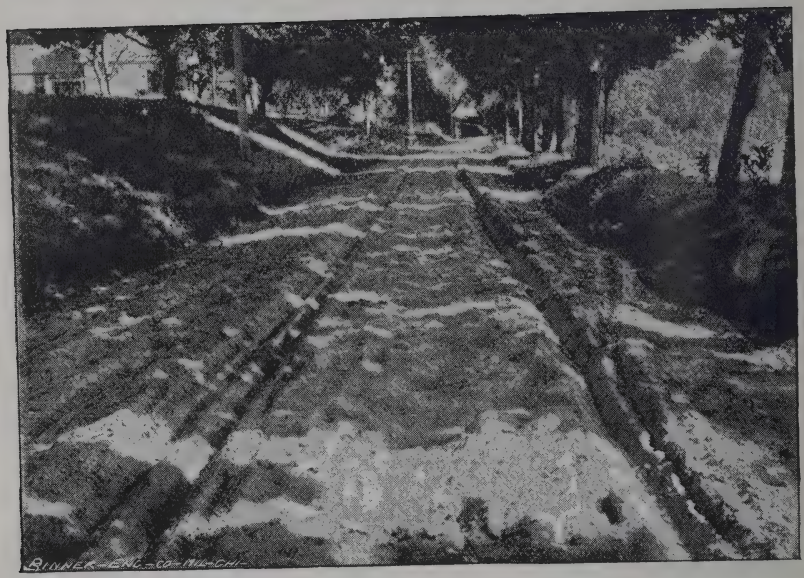

Plate 2.—An Unimproved Sand Road.

file for years without results, that their roads should no longer wait. Therefore, there is an earnest warfare between sections, about which roads should be first improved, but the constantly increasing numbers of counties contesting for the State aid is placing each individual applicant still further from the goal. Listening to the earnest pleadings of the different sections that their specifications shall be first acted upon, consumes a large portion of our time.

To satisfy these demands, the State appropriation should be $300,000 per year. This sum would give to each county, each year, a healthy mileage, the taxation to meet which would not be burdensome, probably not more on the average than one-eighth per cent. on the ratables, and would result in an annual expenditure of over $1,000,000 for improved roads, a rate that would soon place us in a position to attract millions of capital for investment, and thousands of progressive citizens for permanent residents.

It has been urged that this rapidly increasing desire for improved roads should be met by bonding, as has been done by the six terminal counties, which are the homes of much of the wealth of New York City and the seats of the largest cities of the State.

The answer to this is, that agricultural communities, although contributing more largely than any other class to the vitality, strength and wealth of the nation and to the sustenance of cities, are too poor to meet the taxes necessary to construct under the County Bonding Act, which requires the townships through which each road passes to pay one-third of the cost, besides a proportional share of the county tax. Those counties that have been, with the exception of their farming districts, partially improved under this provision were rich before the improvement, and were the centers of immense populations and great aggregations of capital gathered largely from a toll on the productions and the traffic of this and other continents, that necessarily passes through their hands on account of their location on or near the great arteries of foreign and domestic commerce.

The announcement of Secretary Morton, of the Department of Agriculture, that States along the North Atlantic are more heavily encumbered with farm mortgages than those of the West, and that New Jersey carries a debt of this kind greater in proportion to its farm valuations than any other State in the Union, is the strongest possible argument that our country roads should be improved by State aid; so our farmers may be able, by good roads, to rival the

cheap transportation by, rail, of the products of the West and South, which gives their farms a financial position superior to those of New Jersey.

The experience of the past has been that no system of permanent road building has been uniformly and permanently successful unless fostered by the State. By it only can the great arteries be continuously improved, each community, however conservative, being removed as an obstacle and forced to join hands with its neighbor in working for the general good; nor is it fair that townships or counties located on the lines of these great highways, should be forced to be at the expense of improving their roads for the use of those that lie behind to pass their traffic over to reach the great markets that lie beyond. Only by State aid, and regulation along these lines, can our political units, townships and counties receive uniform and healthy development.

The States of this Union are catching on to the car of progress started by New Jersey; why should we halt? No form of State expenditure has been or will be so fruitful in adding to its material and social development.

Massachusetts this year is expending $600,000, and other States are in the throes of formulating laws for large State appropriations for constructing permanent wagonways.

Statements by Engineers and Supervisors.

Following is the Engineers' and Supervisors' more detailed statements of the cost of the different roads:

To the Honorable Henry I. Budd, State Commissioner of Public Roads:

We, the subscribers, the Engineer and Supervisor regularly appointed to superintend the construction and building of the telford stone road leading from the old city line of the city of Burlington to the pier Bridge across the Rancocas river, at Bridgeborough, do hereby certify that the contract was awarded to Keihn & Allen, of Trenton, N. J.; that the work has been done by them according to the specifications, and that the following is a correct state ment of the total cost as per contract, viz.:

Contract Price—

73 cts. per sq. yd. for stone construction 10 in. deep.

70 cts. per cub. yd. for shoulder and clay binder.

20 cts. per cub. yd. for cuts and fills.

30 cts. per cub. yd. for widening and raising causeway to Pier Bridge.

9 cts. per sq. yd. for one extra inch of stone in depth.

27 cts. per sq. yd. for three extra inches of stone the full length of causeway.

The total length of the said road is 19,525 ft. 6 in.; the width of said road is 12 ft.

19,525 ft. 6 in. x 12 ft.=234,306 sq. ft.; divided by 9=26,034 sq. yds.

31,054 sq. yds. at 73 cts.=$22,669.42, cost of 10 in. deep construction.

31,054 sq. yds. at 9 cts.=$2,794.86, cost of 1 in. deep construction.

1,058 ft., the length of causeway, stone 14 in. in depth (3 in. extra) 1,058 ft. x 12ft.=12,696 sq. ft.; divided by 9=1,410.66 sq. yds. of the 3 in. deep stone.

1,410.66 sq. yds., at 27 cts.=$380.88, cost of the 3 inches extra.

Stone gussets or wings where the two stone roads cross at Coopertown, containing 361.66 sq. yds.

82 cts. the contract price for such work.

361.66 sq. yds., at 82 cts.=$296.56, cost of stone gussets.

Shoulder and binder used, 1,920 cub. yds.

2,120 cub. yds., at 70 cts.=$1,484.00, cost of binder and shoulder

Cuts and fills 1,818 cub. yds.

1,953 cub. yds., at 20 cts.=$390.60, cost of cuts and fills.

Increased capacity of enlarged causeway, 1,102 cub. yds.

1,102 cub. yds., at 30 cts.=$330,60, cost for enlarging causeway.

SUMMARY OF COST.

Cost of 10 inches deep stone construction	$22,669 42
" " 1 inch " " "	2,794 86
" " 3 inches " " " (Causeway)	380 88
" " stone gussets	296 56
" " shoulder and binder	1,484 00
" " cuts and fills	390 60
" " enlargement of causeway	330 60
Total cost of road under the contract	$28,346 92

All of which is hereby certified.

CHARLES STOKES, *Engineer.*
CHARLES K. VANSCIVER, *Supervisor.*

The Honorable Henry I. Budd, State Commissioner of Public Roads:

I herewith submit to you the cost of the construction of the Spotswood and Old Bridge road, leading from the Pennsylvania Railroad station in Spotswood to Line Bridge, in town of Old Bridge, in the county of Middlesex:

13,021 lin. ft.	
17,361⅓ sq. yds., at 64 cts	$11,111 25⅓
72⅓ sq. yds. (extra shoulders), at 64 cts	46 29⅓
472⅔ sq. yds., 10 in. deep, at 12 cts	56 68
220 cu. yds. extra excavation, at 20 cts	44 00
1,663 cu. yds. binder, at 69 cts	1,147 47
Hauling over one-half mile	117 85
Engineer	250 00
Supervisor	255 00
Total	$13,028 55

FRED. L. BUCKELEW, *Engineer.*
DANIEL DAWSON, *Supervisor.*

The Honorable Henry I. Budd, State Commissioner of Public Roads:

I hereby submit to you the cost of the construction of the iron ore road, leading from Englishtown station to Manalapan, in the county of Monmouth, improved under the provisions of the State Aid Law, viz.:

For 26,800 sq. yds. of ore pavement, at 21¾c	$5,829 00
For 5,400 cub. yds. of excavation and filling, at 24c	1,296 00
For 7,000 lineal ft. of tile drain	175 00
For carting, extra shouldering material and carting and furnishing materials to fill the tile drains	300 00

For furnishing materials and laying brick and stone work to secure ends of culverts and embankments	$150 00
Total cost	$7,750 00

PETER FORMAN,
Engineer.
JOSEPH WOODWARD,
Supervisor.

To the Honorable Henry I. Budd, State Commissioner of Public Roads:

In accordance with the law, we hereby submit a statement of the cost of grading and paving with telford and macadam pavement, the road known as the "South Pemberton Road," in Burlington county, beginning twenty-five feet south of the saw-mill bridge, on Pine street, Mount Holly, N. J., and extending to the bridge in Pemberton, N. J., as follows, to wit:

Length of road 31,605 feet, or 75 feet less than six miles.

25,698⅓ sq. yds., 10 in. deep telford, at 87c.	$22,357 55
5,250⅓ sq. yds., 10 in. deep macadam, at 75c.	3,937 75
18,738⅓ sq. yds. 6 in. deep macadam, at 48c.	8,994 40
6,515 cubic yds. of extra excavation, at 24c.	1,563 60
Expenses sowing grass seed	23 65
Supervisor's salary	447 00
Engineering expenses	737 53
	$38,061 48

Respectfully submitted,
E. D. RIGHTMIRE,
Engineer.
WILLIAM P. YOUNKER,
Supervisor.

Hon. H. I. Budd, State Commissioner of Public Roads:

As per your request in reference to the amount of work done this year under my supervision, would say that the only road and work done this year was in the township of Palmyra, along the railroad from Palmyra Station to West Palmyra Station.

3,190 feet in length of telford road, 12 ft. wide, 4,253⅓ sq. yds., at 73 cts.		$3,104 93⅓
121 feet, 12 ft. wide, of macadam road, being extension to the above	161.33 sq. yds.	
Intersection with different streets	205 54 " "	
Macadam—total	366 87 sq. yds.	
At 70 cts. per sq. yd.		256 80

156⅔ sq. yds. telford road, at beginning and ending of road, extra width, at 73 cts.	$114 36⅔
455.85 cu. yds. of cutting and filling, at 20 cts.	91 17
268 cu. yds. of gravel, at 65 cts.	174 20
	$3,741 47

Very truly yours,

HOWARD PARRY,
Engineer.
JOEL HORNER,
Supervisor.

NEWARK, N. J., October 19th, 1896.

To the Board of Chosen Freeholders of Essex County:

We hereby certify that Francisco Brothers have completed the grading and paving on the Northfield road, in the townships of West Orange and Livingston, in the county of Essex, and are entitled to the following amount:

Section 1.

Excavation 13,654 cubic yards, at 30 cents.	$4,096 20	
Overhaulage 3,350 " " 500 feet, at 5 cents,	$167 50	
550 " " 1,500 " " 15 "	82 50	
500 " " 1,000 " " 10 "	50 00	300 00
Lineal feet of pavement, 12,150—18,900 sq. yds., at 36 cts.	6,804 00	
		$11,200 20

Section 2.

Excavation 8,925 cubic yards, at 28 cents.	$2,499 00	
Overhaulage 1,800 " " 500 feet, at 5 cents.	$90	
1,400 " " 1,000 " " 10 "	140	230 00
Lineal feet of pavement, 8,238—12,815 sq. yards, at 38 cts.	4,869 70	
		7,598 70

Section 3.

Excavation 9,074 cubic yards, at 26 cents.	$2,359 24	
Overhaulage 900 " " 500 feet, at 5 cents.	$45	
600 " " 1,000 " " 10 "	60	105 00
Lineal feet of pavement, 10,353—16,105 sq. yards, at 42 cts.	6,764 10	
		9,228 34
		$28,027 24

WILLIAM R. JOHNSON,
Supervisor Section 1.
JOHN E. BRUNDAGE,
Supervisor Sections 2-3.
JAMES OWEN,
County Engineer.

To Hon. H. I. Budd, State Commissioner of Public Roads:

We herewith submit an itemized statement as to the cost of the construction of the first section of the Glassboro and Westville road (six miles):

Preparation of road-bed	$293 97
5,866⅔ sq. yds. of macadam at 83c.	4,869 33

29,308 sq. yds. telford at 87c.	$25,497 96
Extra width of telford at intersection, 16⅔ sq. yds. at 87c.	14 50
Extra deep foundation, 870 sq. yds., 1 in. ex. deep, at 7c.	60 90
Engineering expenses	626 11
Supervisor	518 12
Total cost	$31,880 89

J. J. ALBERTSON,
Engineer.
J. WOOD HANNOLD,
Supervisor.

To the Honorable H. I. Budd, State Commissioner of Public Roads:

In compliance with the law, we hereby submit a statement of the cost of grading and building the telford and macadam road in the county of Mercer, leading from the borough line of Pennington to the borough line of Hopewell, to wit:

26,593⅞ yds. of 14 in. telford, at 93c.	$24,732 21
10,806⅔ yds. of 10 in. macadam, at 49c.	5,295 11
6,494 yds. of excavation shouldering, at 75c.	4,870 50
3,469 yds. of excavation binder, at 75c.	2,601 75
10,162 yds. of excavation, at 25c.	2,540 50
2,462½ yds. of rock excavation, at $1.50.	3,693 69
2,231 ft. of tile drain, placing, etc.	356 96
Supervisor	500 00
Engineering expenses	1,030 00
	$45,620 72

JOSEPH L. WATSON,
Engineer.
A. E. STOUT,
Supervisor.

Honorable Henry I. Budd, State Commissioner of Public Roads:

We hereby submit a report of the cost of constructing the telford road on Chambers street and Greenwood avenne, in Mercer county, N. J.:

20,146 sq. yds. 12 in. telford, at 59c.	$11,886 14
20 146 sq. yds. 2 in. telford, extra depth, at 24c.	4,835 04
5,570 cub. yds. extra excavation, at 35c.	1,949 50
7,642 cub. yds. extra fill, at 35c.	2,674 70
1,678 cub. yds. binder, at $1.	1,678 00
8,743 cub. yds. shoulder, at 90c.	7,868 70
	$30,892 08

REID B. BUDD,
Engineer.
WALTER HENNEY,
Supervisor.

Honorable H. I. Budd, State Commissioner of Public Roads:

In compliance with the law, we herewith submit statement of the cost of construction of the Mercerville and Edinburgh road in Mercer county, N. J., under the State Aid Law:

To 17,223⅓ yds. 12 in. telford at 91c.	$15,673 03
To 17,111⅓ yds. 14 in. telford at $1.15	19,677 78
To grading road, excavations, filling, etc., 20,990 yds. at 25c.	5,247 50
To shouldering, 5,872 yds. at 90c.	5,284 80
To binder, 2,861 yds. at 90c.	2,574 90
To Supervisor	518 00
To engineering expenses	765 00
Total cost of road	$49,741 01

JOSEPH L. WATSON,
Engineer.
SAMUEL TINDALL,
Supervisor.

The Hon. Henry I. Budd, State Commissioner of Public Roads:

We hereby submit you the cost of the construction of the oyster-shell road from Pointers to Mannington canal bridge, in Salem county, New Jersey: Length of road, 2⅔ miles.

For delivering at wharf in Salem 100,000 bu. oyster shells, at 2½ cts. per bu.	$2,500 00
For carting, laying up and leveling oyster shells, 12 inches deep and 10 feet wide, and rolling and shaping the roadway, 12,188 sq. yds., at 19¾c. per yd.	2,407 13
Total cost	$4,907 13

DAVID F. GRIER, *Engineer.*
DAVID F. GRIER, *Supervisor.*

PATERSON, PASSAIC COUNTY, N. J., November 9th, 1896.

Henry I. Budd, Esq., Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Replying to your letter of October 28th last, regarding the general condition of the improved roads in this county, I would state that they were never in better condition than they are at the present time.

We have one hundred and six miles of macadamized roads, 4 and 6 inches deep, of which 90 per cent. are 16 feet wide, the balance 12 and 14 feet. In my opinion, the macadamized roads through the country districts should not be built less than 16 feet wide, four inches deep through the cuts and eight inches deep on the fills. During the past year we have expended for repairing these roads about $31,000. Only one new road has been contracted

for this year, namely, the Echo Lake road, which is two and forty-six hundredths miles long, and now under construction.

The maximum grade is 10 feet per 100.

There are two roads that we are about to award the contracts for which will be built next year, namely:

Rea avenue.....length, 4,285 feet.
Little Falls road.....length, 8,044 feet.

The increased value of real estate along the line of the macadamized roads in this county has been very noticeable, and the number of fine residences built along the line of said roads bear out this statement.

Very respectfully yours,

WILLIAM L. WHITMORE,
County Engineer.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—During the year 1896, Middlesex county built 8.43 miles of stone road as follows:

The road from Spotswood to Old Bridge, being 2.47 miles, and the Stelton and Dunellen road, 5.96 miles.

Both roads were of macadam construction. The road from Spotswood to Old Bridge is 12 feet wide, 8 inches deep and cost 64 cents per square yard. J. F. Shanley, or Jersey City, was the contractor.

The Stelton and Dunellen road is 14 feet wide, 8 inches deep and cost 64 cents a square yard. Robert A. Montgomery, of Lambertville, N. J., was the contractor. Daniel Davison, of South River, was the supervisor on the former, and Benjamin S. Letson, of Stelton, the supervisor on the latter road. This makes the total amount of stone road completed to date 32.20 miles.

The sentiment for good roads in this county is very strong, there being at present petitions for nearly 40 miles, from all parts of the county, for the consideration of the Board of Freeholders.

This county has built a number of gravel roads without State aid, which have given good satisfaction, and the general improvement of other roads throughout the county evident.

Respectfully,

FRED. L. BUCKELEW, JR.,
County Engineer.

Jamesburg, N. J., November 28th, 1896.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—The condition of the public roads of Gloucester county has been greatly improved within the period of my recollection—25 to 30 years. I have frequently heard old farmers tell of how they used to drag along through sandy roads, with 30 or 40 baskets of potatoes to market, that number making a heavy load for one pair of horses, while now with the same amount of team, the farmers uniformly cart from 80 to 125 baskets per load, without any especial effort on the part of the team.

The era of the introduction of turnpikes, about the year 1850, improved a number of our roads, and for some years they were about all the good roads of the county; but gradually the other roads were improved, thus detracting from the travel on the turnpikes, and also by the introduction of railroads, a number of the turnpikes were abandoned by the turnpike companies; but now a large percentage of public roads are as good as the former average turnpike.

Previous to the year 1891, all of our improved roads, with the exception of a few oyster-shell roads, near navigable streams, were built of gravel, which is found in nearly every section of the county, and makes a very good road nearly all of the year.

In 1891 the Gloucester Turnpike Company changed its road-bed from gravel to stone (telford), 15 feet wide and 12 inches deep, at a cost of $8,000 per mile, the road extending from Woodbury to Gloucester ferry, a distance of four and one-quarter miles, two and one-half miles thereof in Gloucester and one and three-quarter miles in Camden county.

In 1892, the Mullica Hill and Woodbury Turnpike Company built two and eight-tenth miles of telford road, from Mantua to Woodbury, 12 feet wide and 10 inches deep; cost, about $8,000 per mile.

In 1895, under the State Aid Act, the Board of Freeholders built 6½ miles of telford road, from Paulsboro to Westville, 10 feet wide, 10 inches deep, cost about $4,900 per mile; also 1½ miles of telford road, through the village of Swedesboro, 9 feet wide and 12 inches deep, with macadam edges or wings, 3 feet wide and 6 inches deep, which cost $6,000 per mile.

During the present year the Board of Freeholders have built one mile of macadam and five miles of telford road, on road from Westville to Glassboro, at a cost of about $5,200 per mile.

There has been an outspoken sentiment in this county in opposition to the Stone Road Law and the building of stone roads, based mainly upon the fact that the cost of building stone roads is so great that necessarily but a small portion of the roads can be thus improved, and, therefore, a limited number of taxpayers directly benefited thereby, but not generally opposed to road improvement. If an equal amount now raised by taxation and otherwise for stone roads were expended by county and State in grading, draining and graveling our public highways, a much greater percentage of our roads could be improved, and therefore the improvements could be distributed more generally over the county, and a large per cent. of the taxpayers would be thus enabled to reap the benefit, thus overcoming to a great extent the opposition.

The broad tire (4in. tread) is becoming used to quite an extent in the county, and is being encouraged in some of the townships, by the township, at their town meeting, voting an appropriation to be expended or applied toward the partial payment (about one-third) of the cost of changing a wagon from the narrow to the broad tire, and the good effect upon the roads is, I think, becoming noticeable, and I predict that it will be but a few years when all wagons of heavy burden will be the broad tire. Surely that would do much toward good roads.

Very truly yours,

WILLIAM M. CARTER,
Engineer

Woodbury, Gloucester County, New Jerse

MAGNOLIA, N. J., November 15th, 1896.

Hon. H. I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—I herewith submit my report of the first work of the kind ever done in Atlantic county. Our prediction in reference to a road across South Jersey is almost fulfilled. Atlantic county realized the importance of a good road from Philadelphia to "*America's greatest pleasure resort*," Atlantic City.

Their county road passes through the towns of Hammonton, Elwood, Egg Harbor, a distance of twenty-two miles, to Absecon. Now we have a first-class gravel road to Pleasantville, thence via a good gravel turnpike across "The Meadows," a distance of five miles, to Atlantic City. A portion of the distance, between Hammonton and Absecon, passes through unimproved wood land. The owners of these lands were not willing to pay the ten per cent. of the total cost, as is customary on other roads built under the State Aid Law. The Freeholders availed themselves of that portion of the act which allows the county to pay 66⅔ per cent. of the entire cost, and the State the balance, without calling on the abutting property owners for any part of the cost of the construction. The route selected passed near some good gravel beds. A large portion of the surface of the land is shifting white sand, which, when graded and sloped, forms very good natural drainage. In many places the old road was very crooked and only five feet wide, thus rendering it impossible to turn out when another wagon was met, which was a rare occurrence. The growing brush would scratch the wheels of passing conveyances.

We surveyed a new line as nearly straight as possible, fifteen miles of which is without a bend. This line crossed a swamp two thousand feet long, over which we built an embankment three feet high and digged a ditch 7,500 feet long, to drain this pond.

The county, in this neighborhood, is very flat. We removed all the trees, stumps and roots from the line of the proposed road to a width of 50 feet. We then plowed and graded a strip 30 feet wide, along the center line of which, to a width of 14 feet, we applied a coat of gravel, which, when thoroughly rolled and solidified, is 8 inches deep in the center and 6 inches deep on sides. Then we scraped up the local earth shoulder, so as to make a uniform curve to top of the finished road to a width of 30 feet.

Most of the gravel pits were covered with sand varying in depth from 3 inches to 3 feet. This was removed by the contractor at 12 cts. per cubic yard.

Much of the gravel was gratuitously presented by the public-spirited owners of the pits along the line. The balance we bought at about 8 cts. per cubic yard, measured on the road.

The question of locating pits, and selecting suitable gravel therefrom, was one of the most difficult tasks in the construction of the whole work. The contractor was paid in proportion to the distance he carted it, at a price named in contract per cubic yard, for each half-mile or fractional excess.

I will herewith submit a copy of my gravel-road specifications, which I hope you will have space to include in your report. I was unable to find any forms to guide me in their preparation. I could not find a copy of those used in the construction of old gravel turnpikes of forty years ago. I might suggest a few modifications which actual experience has taught could be made to advantage; but, on the whole, they have worked well. There are more questions to be considered in the construction of such a gravel road than a stone road. I

would not recommend a gravel road for every locality. When we consider the natural drainage the Atlantic county sands afford, and the fact that most of the travel will be bicycles and light wagons, and that in the summer, a gravel road will answer every purpose, and much cheaper. This road costs about $1,300 per mile.

This great thoroughfare, all cleared out fifty feet wide, will make a valuable fire line through "*South Jersey's Pine Barrens*," and will doubtless be the means of saving thousands of acres of valuable timber from the ravages of forest fires, which are so common and destructive in this locality.

I understand you have embodied my views on *wide tires* in your own report, so will not again express them.

Sincerely yours,

J. J. ALBERTSON,
Engineer in Charge of Atlantic County Road.

MOUNT HOLLY, N. J., Dec. 1st, 1896.

Hon. H. I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Answering your letter of October 28th ult., I would say that, although a new-comer to Burlington county, I was honored with the appointment of Engineer on the road from Pemberton to Mount Holly, commonly known as "The South Pemberton Road," and that I devoted most of my time and attention to the construction of said road during the past summer. This is one of the heaviest traveled and most important roads in the county, and I think I may be pardoned if I say that we have succeeded in getting one of the finest and most practicable stone roads ever constructed in the State at the same cost per mile.

The specifications for said road were drawn by me in conformity to the ideas expressed by you, in order to get a wider road than had heretofore been constructed in this county, at a very little greater expense.

The road is fourteen feet wide, eight feet in the middle, ten inches deep, of telford, and on either side three feet wide, six inches deep, of macadam; the cost being reduced by the depth of the wings on either side of the ten-inch telford. The only objection to the wings is, heavily-loaded wagons going on and off may have a tendency to rut, owing to the loose earth shoulders, which, however, have been improved by sowing grass seed along the pavement. The construction was different from other roads in this county, no clay for binder being used. On the telford foundation was put a small quantity of earth. No earth of any kind was used on the remaining courses; dust and stone screenings, in sufficient quantity, were used as a binder and well watered. So far, I am well pleased with the result of this mode of construction. If it is not affected during the dry weather any more than clay binder, it is preferable, as it is clear stone construction, and shall be recommended hereafter.

Stone roads are not only an improvement to the road improved, but to the adjoining land. No one owning a farm realizes the benefit to be derived from a good road until he has such along his farm, or in his immediate vicinity. It not only makes it convenient for the transportation of farm produce, but it increases the value of the farm. Farmers in this county will travel miles out

of their way to get on a stone road, as it saves time and expense by so doing; therefore, as to the intrinsic value of stone roads, they themselves are their own vindicator. Some might think it pays to continue in the same old rut that has been worn-out years ago, and use two teams in place of one. Would it not be wise to have a good road and dispose of the extra team? I do not think it necessary to stone all roads in the county, but the most prominent ones should be, as soon as the appropriation could be made without encumbering the county with bonds. What is meant by prominent roads are those most traveled, and leading from a city or town?

When a stone road is completed, the general impression of the people is that it will last forever without any attention (at least they previously had such), which is a serious mistake. They need as much attention as a good gravel road, *i. e.*, in the extreme heat of summer, the most essential thing to be done is to water with watering-carts and follow by rolling. With wide tires and wide whiffle-trees on heavy wagons (which all owners of such should use, in fact there should be a law to govern the width of tires), if they were used, it would not be required to roll often, as the wheels with wide tires would act as a roller instead of rutting, as do the narrow ones. If such were done it would not be necessary to think of using the steel rail, which is not perfection. In putting down this rail it will be required to place on the road-bed cross-ties and sleepers in repairing same; *i. e.*, taking old ones out and replacing with new ones will damage the pavement between the rails, no matter what kind of pavement it might be; with other objections, as right of way, etc.

The greatest wear upon stone roads is caused, first, by the calks on the shoes of the horses; second, by the wheels of the heavy wagons; but by wide tires there would be comparatively little wear by the wagon, thus most of it is caused by the horses, which can be overcome to a very great extent by the horse traveling in the wheel track; therefore, you see the steel rail is to do away with the lesser of the two evils. This is why I do not as yet think the steel rail an improvement in road building, as it is constructed at a greater cost, with very little benefit derived from the extra expense.

"The character of depth and width of road that is most economical and sufficient to answer the purpose," is a question that can not be answered without a great deal of study and experience. Some engineers claim that the sandy road-bed is more suitable for a four or six-inch pavement, for durability, than the red clay formation. I think in some parts of our county, where the beds are very sandy, a six-inch road would stand but a very short time, as the farmers put from two to five tons upon their wagons. Drawing them over a shallow pavement with a sand formation might cause the stone in the bottom to move, and, in a very short time, stone and sand would be mixed together. Under the same conditions the red clay would be firm, excepting in the freezing and thawing season.

Very truly yours,

E. D. RIGHTMIRE.

MAGNOLIA, N. J., November 25th, 1896.

Hon. H. I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—We are glad to announce that Camden county has six completed free stone roads without increasing the county's bonded debt. These valuable acquisitions to the county property have been made and the taxpayers scarcely knew it. With one exception we now have all our principal avenues leading to the Philadelphia ferries stoned. They are not all free roads. We still have some turnpikes built by private corporations and now tolled. Each one of these toll roads feels the sharp competition of the free roads built under the "State Aid Law," several of which parallel the toll roads. I would again urge that the State and counties take some action toward relieving the owners of the turnpike securities of this unequal competition. Another unjust feature about the toll roads is that the regular patrons living along these thoroughfares are compelled to pay their toll, which is a direct tax, and they are also taxed to build and maintain roads in other parts of the county, which they seldom use. This amounts to double taxation for the same general purpose.

Our completed roads have been a great source of comfort and pride during the past year. Nature has been kind in sending showers about as often as was necessary to keep the surface from disintegrating. Our county now has an efficient Supervisor of completed county roads, at a salary of $600 per year. He looks after the repairs of these roads closely; he has obtained very good results from the application of a slight coat of clay-gravel applied in the spring and summer. This acts as a binder and prevents disintegration, and is a good, cheap substitute for water artificially applied. It is not quite so pleasant during a very rainy season as stone dust or screenings, which we freight one hundred miles or more, but the difference in the cost more then compensates for inconvenience attending a slightly sloppy surface during the excessive wet weather. It is the intention of our Supervisor that this gravel-coating should be worn-out and blown off by the time our regular autumn rains set in.

The bicyclist has brought about a change in the sentiment toward road improvement. Four years ago there was great objection to this expenditure of the public funds, particularly from the city; we no longer hear of any opposition from this source. Since all our principal thoroughfares near our great city have been improved, the more distant points have caught the contagion, and the most remote townships now want an improved road, and application has been made to connect the easterly end of our White Horse stone road at Berlin with the Atlantic county road at Hammonton. This link is about eleven (11) miles long and passes through a sandy soil conveniently interspersed with good gravel beds. This section will be built with gravel, which will answer every purpose and at a great immediate saving in cost. I hope you will reserve enough money in your distribution of 1897 to help us out with one-third of the cost of this improvement.

Sincerely yours,

J. J. ALBERTSON, C. E.,

Camden County Engineer.

MAGNOLIA, N. J., Nov. 20th, 1896.

Hon. H. I. Budd, State Commissioner of Public Roads, Trenton, N J.:

DEAR SIR—Gloucester county has almost doubled its length of free stone roads during the present year. We just finished six (6) miles of stone road on the line of the old abandoned Glassboro turnpike, which was originally built of gravel by a private corporation for toll purposes. This earth road could not stand the completion of a railroad from Glassboro to Camden, particularly since the gravel was so scarce along the line, thereby making the maintenance expensive. It was abandoned and all the invested capital sunk; the stockholders' loss was the county's gain. There could be no better foundation for a stone road than a gravel turnpike already graded. The gravel removed to make room for the stone bed forms a splendid shoulder for the stone-work. We built one mile of 10-inch macadam in this road at 84 cents per square yard; the balance was of telford construction at 87 cents per square yard for 10 inches deep.

Experience has taught the Gloucester county people that gravel is not the proper road metal for them. The farmers demand a good smooth road at all times of the year. They do much heavy carting in the winter and spring. They are not satisfied with less than three tons of manure at a load for one pair of horses. This is more than a gravel road will sustain, in wet times particularly, on a narrow-tread wagon. The county seat and only city of this county is peculiarly situated with reference to its free stone roads, one of which passes on each side of the city of Woodbury, by the most direct route by the way of Gloucester ferries to Philadelphia. This naturally makes the Woodbury people very indignant, as their city is side-tracked and the stores lose the country patronage and other benefits to be derived from good roads. We can't expect much other than opposition to free road improvement from this conservative town and other small towns along the line of the old toll turnpikes leading out of Woodbury, which are taxed to build these improved free roads and don't get a share in all of the direct benefits. There has been more opposition from this immediate unfortunately-located section than from any other part of the State.

From this purely agricultural county the profits in farming for the past three years were not sufficient to warrant paying for all the stone-road improvement as fast as it is made; so the county has availed itself of the provisions in the law and issued 4 per cent. bonds to meet these payments. The eastern part of the county feels very grateful to you for your approval of the specifications for the remaining five and one-half ($5\frac{1}{2}$) miles of the Glassboro road, thereby insuring them a good free road to Philadelphia. We expect to open bids for this work at the next regular meeting of the Board of Freeholders in January, 1897.

I regret to say that the Crown Point telford road, built last year and still in the contractor's charge, has not at all times received the necessary care.

The Swedesboro road was formally accepted last summer; the people in that neighborhood are delighted. The road is now, and always has been, in splendid order. On the 19th inst. this county elected a supervisor of completed county roads, at a salary of $200 per year, for a term of three years.

Yours truly,

J. J. ALBERTSON, C. E.,

Engineer in Charge of Gloucester County Work.

OFFICE OF J. DOUGHTY, JR., COUNTY ENGINEER,
SOMERVILLE, N. J., Dec. 14, 1896.

Hon. H. I. Budd, Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Your request for information concerning the roads in Somerset county received. I wish I were able to give you a comprehensive description of the present condition of all our roads. I can only say that we have none of the best and some of the worst roads in the State. None of the best, for no stone roads outside of village limits have been constructed either by public or private enterprise, or under the operations of the State Aid law. Some of the worst, because at certain seasons of the year our peculiar shale and clay soil seems to have no foundation. Abutting counties, Morris, Mercer, Union and Middlesex, are far ahead of Somerset in the matter of stone roads, whereas a contrary position should exist.

Somerset county is the garden spot of the State. The rich soil, fertile valleys and undulating plains of the southern townships so well adapt them to agriculture and improvement, that they have attracted the attention of capitalists, who, for pleasure or profit, have established large stock farms. No less than ten of these farms are, within a radius of ten miles, now engaged in the breeding of high-class horses.

In the northern section of the county, the highlands of Bernards and Bedminster have furnished sites for the Summer residences of a large number of prominent and wealthy New York families, who are drawn here by our accessibility to New York, the beauty of scenery and many other advantages.

Somerset county is geographically divided into two equal parts by a double range of Trap Mountains passing in a circular form through Bedminster, Bernards, Bridgewater and Warren townships.

With the horse-breeding industry calling for good roads, with the influx of so many new and desirable citizens who use and appreciate good roads, with our neighboring counties on every side extending their good roads to our very doors, with the best of material in every township, Somerset county should have been among the first, instead of the last county, to see the necessity of this improvement.

The Board of Freeholders are to be commended for the successful manner in which they have conducted the finances of this county, and it is to their desire to continue their excellent record that the building of stone roads was not begun a year or two ago.

However, when the holders of two-thirds of the property, bordering on two roads, took advantage of the Law of March 22, 1895, their petitions were, of course, answered, and we have now begun the construction of our first six and a half miles of roads. Contracts for their building were awarded November 18, 1896. That of Union avenue from Somerville easterly to and through the borough of Bound Brook to county line, a distance of four and a fourth miles, was awarded to Messrs. Hillpot and Ayers, of Bound Brook, at 43 cents per square yard, for 8-inch macadam. Contract for Mountain avenue, from Somerset street in borough of North Plainfield easterly to county line, a distance of two and a quarter miles, was awarded to A. I. & N. B. Smalley, of North Plainfield, at 43 cents per square yard, for 10-inch. rock road.

Both roads are to be 16 feet wide.

Work on Union avenue will not be started until spring. Ground was broken on Mountain avenue three days after award of contract, and in sixteen working days the stone was laid and partly rolled for a distance of 2,100 feet.

Two different bids were asked for the building of this road. One called for 8,190 feet of 8-inch macadam and 3,358 feet of 12-inch rock; the other for 11,548 feet of 10-inch rock the total distance. The lowest bid for 10-inch rock being $823.25 lower than for the macadam and rock, it was accepted.

It consists of 6 inches of rock foundation and 4 inches of 1½-inch macadam. The rock foundation differs from telford in manner of laying. While the rock is hand-laid and stone fitted to stone, and smaller stones thrown over the top and chinked in, the care is not taken to stand on edge, fit, wedge and make universally solid, as is supposed to be done with telford.

The property-owners did not want the expense of building a telford road, but yet seemed to want a road with more foundation than an 8-inch macadam would give them. While I do not approve of a loose stone foundation, I believe that on this road it will be laid as well as many telford roads have been laid at telford prices. I look at the work upon this road as an experiment, and will watch the result with considerable interest. Being well laid, it will be a fair test as to the life, utility and cost of maintenance of a road of this nature in comparison with a well or indifferently built telford.

The start that has been made in road improvement has aroused a desire among property-holders for the improvement of other and more important roads, but the State appropriation per county is growing so much smaller each year that I fear we cannot progress as fast as we would like unless the appropriation be increased.

JOSHUA DOUGHTY, Jr.,
County Engineer.

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF ROAD INQUIRY,
WASHINGTON, D. C., December 4, 1896.

Hon. H. I. Budd, State Commissioner of Public Roads, Trenton, N. J.:

MY DEAR SIR—I avail myself of your kind offer to give space in your annual report to a communication from me upon the educational or other lines of work which are at present absorbing the attention of this office.

Your State is already so far in advance of most others, in both the educational and practical work for road improvement (the latest instance of it that of the spirited volunteer work of the citizens of Ocean and Monmouth counties now in progress), that I find it difficult to discover a topic upon which much can profitably be said.

Your State, however, having taken the lead in most of the educational and practical movements hitherto inaugurated, may be disposed to take up the very latest suggestion in this direction. I send you, therefore, copies of my correspondence with the Commissioner of Education on the subject of daily care of the ordinary country roads, and of the training of the growing generation both in the need of good roads and in the actual construction and maintenance of earth roads.

The correspondence is as follows:

WASHINGTON, D. C., June 2d, 1896.

DEAR SIR—If your supervision extends to country schools, you will naturally feel a deep interest in the improvement of country roads, and I shall take leave to solicit your co-operation in devising some practicable method for bringing the aid of school superintendents, teachers and pupils, into the campaign for road improvement, which is now so happily opened all over the country.

I send you a copy of Circular 17, of this office, and of a letter addressed to members of Congress, which is being widely and enthusiastically responded to by them. On pages four and five of the circular you will find a suggestion which points toward what might be done in schools if a proper interest in the subject were engendered. It occurs to me that not only might a moderate amount of primary instruction in road-making be given in the common schools, but a practical and valuable application could be made of such instruction

The great want of the country roads is daily care, and such care would be extremely costly under the present methods of management, but the roads of the country are actually patrolled twice a day by school boys old enough to give the necessary attention to throwing out stones, opening ditches and sluices, draining off storm-water, filling ruts and holes, etc., and giving notice to the proper authorities of anything needing prompt attention on their part. If junior road leagues for this purpose were organized in the school districts and a few light, handy tools kept at the school-house, and perhaps prizes offered in each township for the best service rendered, very great practical benefit to the present roads would result at little or no cost, while training up a generation of road-builders for the future. Country teachers would naturally take a great interest in this work, and any improvement in roads would, of course, be a benefit to the schools. In the localities in New Jersey where roads have been generally improved, the country schools have recalled many scholars who had been drawn away to the city schools, and who now come in on bicycles from miles around.

My object in asking you for a list of the State superintendents of education was to enable me to bring this matter to their attention, and if possible to have it favorably presented to the National Convention of teachers to be held this summer, but before doing this I shall be glad to have any suggestion from you upon the subject.

Very respectfully,

ROY STONE,
Special Agent and Engineer.

To WILLIAM T. HARRIS,
U. S. Commissioner of Education.

DEPARTMENT OF THE INTERIOR, BUREAU OF EDUCATION,
WASHINGTON, D. C., June 6th, 1896.

MY DEAR SIR—Your letter of June 2d, calling my attention to the movement on foot to improve the roads of the rural districts of the country, and suggesting that the schools might co-operate in some manner, has been received, and I think your suggestion a very good one. It is clear that teachers may form road committees among their pupils, and that at proper times and seasons the attention of the school could be called to the methods of making a road and the means of preserving it. The most feasible way to reach the

schools would be through circulars like your No. 17. I think, too, that Bulletin No. 8 of your Bureau, on "Construction and Repair of Earth Roads," would be useful, and if you could supply this Bureau a number of copies, I could send them direct to the County Superintendents in the several States.

Any circular describing the method by which the roads have been improved in any one State, or giving information regarding roadmaking materials, and the best method of constructing and repairing roads, would be of service. I could ask the County Superintendent to inform me how many copies he would like of the circulars to distribute to his several schools; the circulars could be sent by him to the rural schools of his county with the request that the teacher appoint a committee of four or five bright boys and loan them the circulars to study at home. There are many ways by which this very beneficent movement can be forwarded through the schools, and I thank you for calling my attention to it, because I shall be pleased to help so good a cause in any way you can suggest.

Very respectfully yours,

W. T. HARRIS,
Commissioner of Education.

To ROY STONE,
U. S. Department of Agriculture,
Washington, D. C.

The primary object of this correspondence was, of course, to enlist the great educational organization of the country in the present campaign of agitation and instruction and to train up a generation of better-road builders for the future.

This proposal has been heartily seconded by many of the State and County Superintendents of schools and very fully approved by many of our correspondents. It has been objected that road-repairing is not "work for boys," but for a trained force of men. This is entirely true in such very limited sections of the country as have been able to build roads of the very best type and are able to repair them in the foreign manner, either by daily care of paid labor or by occasional general repairs by skilled road-makers, but for the present roads, in a great majority of our districts, such a system of repairs is still far in the future.

In most of the States the "labor tax" still prevails and a long campaign of education will be required to abolish it. In these States there is not actually enough money available, as a general rule, to provide the needed implements for road work, much less to give constant employment to a trained force. In most cases, even if the whole road tax were paid in money, it would be entirely insufficient to employ a suitable force. The average road tax throughout the country is about $30 per mile of road. In large sections of country it is not above $10 or $15. But, taking the average, if a "force" consisted of a single man and horse, at a cost of $500 a year, it would have to cover 17 miles of road, and "daily care" would be out of the question, while the amount of travel required for any kind of care would be out of all proportion to the work actually done.

Some other method of providing daily care must be found for our country roads if we are to stop the constant deterioration from wear and weather, which deterioration amounts to the whole $40,000,000 per annum now spent to *restore*

the roads, not to *improve* them. In some few localities thrift and public spirit are sufficiently universal to secure the care by each land owner of the road along his own front, but since one neglectful owner or tenant may break the chain, this system rarely succeeds for any length. No plan of constant repair appears to be available, unless the one I have suggested should meet with acceptance.

The repair of macadam roads undoubtedly requires skill and hard labor, and the services of "trained men" are necessarily required, but the work I have proposed on our present country roads is distinctly "work for boys," and work the boys will like, if they are properly encouraged and provided with the necessary tools. A great portion of the road-work of country districts is already done by boys; indeed, it is a complaint frequently made that "boys and colts" are sent to do it.

The savings resulting from constant care to the roads would aggregate many millions; these could be spent in permanent improvements, and a great betterment of the roads effected without any increase of taxation, while the interest aroused by the boys and teachers actually engaging in road improvement might do more to create a proper public sentiment in rural districts than all that is being done by the Government, the road organizations and the press.

It is not to be expected that many school districts will take up this work at first. It requires that the teachers be competent, the boys ambitious and the road authorities liberal and progressive, and this combination will be comparatively rare. But it will be found in some places, and if the work is successful it will rapidly spread. It will be found in New Jersey, if anywhere. Although the State is making great progress in road improvement, it will be many years before the whole State can be covered with good roads. If the teachers and scholars of the country schools in the State will take up this branch of the movement, they may accomplish almost as much good as the workers for larger road improvement have done, and are doing, and set an equally good example to other States.

Very truly yours,

ROY STONE,
Special Agent and Engineer.

APPENDIX.

Appendix A.

Form of Specifications Used for Macadam and Telford Construction Under the State Aid Law.

PREPARATION OF ROAD-BED AND STONE CONSTRUCTION.

Excavation.

The roadway to the width feet in the center, on such location as the engineer may direct, is to be excavated or filled to conform to the profile and cross section as furnished by the engineer.

All earth from cuts on the line of the road to be deposited at such places as the engineer may direct, within one-half mile, or removed from the line of the work, if so ordered.

Underdrains.

Under-drains, if found necessary, shall be constructed by the contractor (at prices named in the bids) of good four-inch sole tile, laid upon a board of not less than one inch in thickness and six inches in width, or of stone, as may be determined upon, whenever and wherever the engineer shall decide. Top of tile to be at least 30 inches deep.

Rolling the roadbed.

Objectionable Material.

The road-bed, if deemed necessary by the engineer, must be rolled or rammed to a resistance to his satisfaction. If any depressions form under such rolling, owing to improper material or vegetable matter, the same shall be removed and good earth substituted and the whole re-rolled until thoroughly solid and to above-mentioned grade.

Macadam or Telford.

The construction to be either macadam or telford, or both, the location and kind to be determined by committee in charge.

Foundation for Macadam.

After the road-bed has been formed and rolled as above specified, and has passed the inspection of the engineer and supervisor, the first layer of broken stone consisting of two and a half or three-inch stone, shall be deposited in a uniform layer having a depth of inches, and rolled repeatedly with a roller weighing not less than ton to the lineal foot until compacted to the satisfaction of the engineer.

Binder between first and second course.

On the first course a small quantity of binding material may be spread. The quantity and quality of this and all other binding to be at all times subject to the approval of the Engineer.

Second course of broken stone.

The second course, of broken stone, shall consist of inch and a half stone ; that is, every piece of stone shall be broken so as to be passed through a ring two inches in diameter, and no stone shall be more than two inches or less than one inch long. This course to be spread in a uniform layer to a depth of at least inches,

and rolled until thoroughly settled into place to the satisfaction of the supervisor, under the instruction of the Engineer.

Final rolling and surfacing.

When the two courses are thoroughly rolled and consolidated, a coat of three-quarter inch stone and screenings is to be spread of sufficient thickness to make a smooth and uniform surface to the road when thoroughly rolled. Rolling to be done by Contractor with a roller to be approved by Engineer, until the road becomes hard and smooth, and a small stone placed on the surface will be broken before being driven into the road. Any depressions formed during the rolling or from any other cause are to be filled up with three-quarter inch stone and screenings and the roadway brought to a proper grade and curvature as determined by the Engineer. Water while rolling must be applied in such quantities and in such manner as to completely fill all the voids between the broken stone with the binding material, saturated so as to secure a set.

Manner of working binding material.

The binding material shall be worked in and through in such manner and with much implements as the Engineer and Supervisor may direct, and shall be applied to such an extent as is necessary for puddling, and until it is thoroughly incorporated with broken stone and the whole road-bed is compactly bonded together into a solid mass.

Manner of rolling.

In the rolling the roller must start from the side lines of the stone-bed and work towards the center unless otherwise directed. The rolling shall at all times be subject to the direction of the Engineer and Supervisor, who may from time to time direct such methods of procedure as in their opinion the necessities of the case may require.

Telford foundation.

The telford foundation shall consist of a course of stone of average depth of not more than six inches, to be set by hand, as a close, firm pavement, the stones to be placed on their broadest edges lengthwise across the road and so as to break joints as much as possible, the breadth of the upper edge not to exceed four inches. The interstices are then to be filled with stone chips, firmly wedged by hand with hammers, and projecting points broken off. No stone to be used of a greater length than ten inches, or width of four inches, except each alternate stone on outer edge, which shall be double the length of the others and well tied into the bed of the road. All stone with a flat smooth surface to be broken. The whole surface of this pavement is to be subjected to a thorough settling or ramming with heavy sledges and rolled to the satisfaction of the Engineer and Supervisor.

Finishing course for Telford road.

Upon the foundation so prepared inch and a half stone, as above defined, shall be laid in a uniform layer to a depth of at least inches, and the surface finished as above with three-quarter inch stone and screenings. A layer of clay binder, or other good material, may be used if Engineer so direct.

The provisions as to manner of rolling and finishing the Telford road shall be the same as in specification for the Macadam road, as hereinbefore stated, and no stone other than those used in the foundation course shall be more than two inches long.

Dimensions of finished roadway.

The finished roadway must be at least feet wide and at least inches thick for Macadam road and at least inches thick for Telford road.

No allowance in measure of depth of pavement will be made on account of any material which may be driven into the road-bed by rolling. The pavement when completed must conform to the grade and cross section and be satisfactory to the Engineer, whose decision shall be final.

Shoulders of the roadway.

The contractor will grade the unpaved slopes of the roadway wherever they occur, according to the plans furnished by the Engineer, for a distance of at least feet on each side of the roadway and to the gutter lines, so as to admit of a free and easy flow of water from the road to the nearest natural outlet or running stream; and in no case will water be permitted to stand along the road or in the side ditches or gutters. All ditches necessary for the drainage of the road are to be opened by the contractor. The shoulders on both sides of the road are to be thoroughly rolled until they are sufficiently compact and solid to support the edge of the pavement; and before the last rolling covered with a suitable sowing of grass seeds. And, where necessary to fill, in order to conform to the grade of the road, the materials excavated as required shall be used and carefully consolidated by rolling.

Extra filling and price.

If the excavated materials from the roadway are found insufficient, or of poor quality, the contractor must provide enough extra filling from a pit, to be paid for as extra excavation. Price per cubic yard named in accepted bid will be allowed the contractor for overhaul of a distance of each half mile; no allowance for fractions of a half mile. When deemed advisable by the Engineer, fills shall be allowed to settle for such periods as he may direct, and shall also be consolidated, by rolling in six-inch layers if, in his judgment, it be necessary.

Quality of stone.

All stone used in the construction of said road or avenue shall be of the same kind and quality, or equally as good in every particular, as that shown in the Engineer's office.

The contractor must furnish samples of the kind of stone intended to be used in the work to the Engineer before the opening of the bids.

The stone used for the foundation course for the Macadam or Telford must be of hard, durable nature, not liable to disintegration by frost or weather.

The inch and a half stone, three-quarter inch and screenings must be of the best trap-rock, broken by the most improved modern stone-crushing machinery, in uniform sizes, as nearly cubical as possible, and must be free from clay, dirt or other foreign substances.

GENERAL CONDITIONS.

Alignment grades and estimates.

All lines and grades given, and quantities of work done under these specifications will be estimated by the Engineer, who shall be employed and paid by the Board of Chosen Freeholders.

Preservation of stakes and bench marks.

The Contractor will be required to preserve all stakes and bench marks made and established, on the line of the work, until duly authorized by the Engineer to remove the same.

Work and materials must agree with these specifications.

All the material furnished or work done which, in the opinion of the Engineer, is not in accordance with these specifications, shall be immediately removed and replaced by other work or material which will be satisfactory to the Supervisor and Engineer.

Engineer to approve of sample of stone.

Before any materials are placed on the road or avenue the State Commissioner and Engineer shall approve of the quality of sample of the same, to be furnished at the Engineer's office.

Subdivision of the work.

The work under this agreement is to be prosecuted at and from as many different points in such part or parts of the street, avenue or road on the line of the work, as the said Engineer may from time to time direct.

Contractor to remove encumbrances.

In case there shall be at the time stipulated for the commencement of the work any trees, stumps, roots, rubbish or other encumbrance on the line of the work, the same is to be removed at the expense of the Contractor.

Approaches.

The Contractor will be required to grade the approaches of all connecting roadways.

Measurement of the road.

The quantity of the road laid is to be determined by surface measurement.

Road to be equally advanc d.

The stone construction of the road shall proceed, so as to be equally far advanced, across the entire width.

Right to build bridges, culverts, &c., and suspension of work.

The right of the county to build bridges, culverts, etc., or lay any pipes or other appurtenances, in connection therewith, in said street, road or avenue, during the progress of the work, is expressly reserved ; as well as suspending the work or any part thereof during the construction of the same for the purpose above stated, without further compensation, to the Contractor, for such suspension, than an extension of time for completing the work, as much as it may have been delayed by such suspension.

Stopping work on account of weather.

The Supervisor may, at his discretion, stop any portion of the work, if in his judgment the weather is such as to prevent the same from being done properly. No allowance, of any kind, will be made for such stoppage, except an extension of time, for completion of the work, as is herein provided for.

Inspection

All material and workmanship, of any kind, shall be subject at all times to the inspection of the Engineer and Supervisor. Whenever unfaithful and imperfect work is discovered, it shall be repaired or replaced by the Contractor, after due notification from the Engineer and Supervisor.

Explanation of terms.

The meaning and intent of these specifications shall be interpreted by the Engineer, and in case any dispute shall arise concerning the same, it shall be decided by the Engineer, and his decision shall be final. All directions and determinations necessary to give due and full effect to any of the provisions of these specifications shall be given by the Engineer and Supervisor.

Repairs.

The Contractor shall keep the finished roadway in repair for the space of one year, from the date of its completion and acceptance, and as much longer as for any period or periods during said year it shall be out of proper condition; and if during that time the roadway or any part of the work shall, in the judgment of the Engineer, Supervisor and Road Committee, require repairing, and they shall duly notify the Contractor to make repairs as required, and if the Contractor shall refuse or neglect to do so, to the satisfaction of the said Engineer, Supervisor and Road Committee, within five days, from date of service of notice, then said Engineer, Supervisor and Road Committee shall have the right to have the work done properly by other parties and pay the expense for the same out of the five per cent. retained.

Payment and moneys retained.

Monthly payments will be made by the Board of Freeholders to the Contractor, if desired, for all completed work, upon presentation by him of the proper certificate of the Engineer and Supervisor, to the extent of eighty per cent. of the amount then due. Fifteen per cent. will be paid at the completion of the work. The balance (five per cent.) will be retained by the said Board of Freeholders, to keep the roadway completed by the Contractor in good repair, in case said Contractor fails to do so during the period of one year, after the expiration of which time the said balance of five per cent. or such portion of it as has not been expended as aforesaid will be paid over to the Contractor.

Penalty.

The sum of $25 for each day that the work shall remain uncompleted after the time allowed by contract, may be deducted from any moneys due Contractor as liquidated damages. A bonus or premium of $1 per month will be paid the Contractor for each month the road is completed before the time specified in the contract.

Bonus.

Fulfillment of contract.

If at any time the work under contract should be abandoned, or if at any time the Supervisor should judge and so certify in writing that the said work, or any part thereof, is unnecessarily delayed, or that the Contractor is violating any of the conditions or covenants of this contract, or is executing the same in bad faith, the Board shall thereupon notify said Contractor to discontinue all work under this contract, and may employ other parties to complete the work in such manner as they may decide, and use such materials as they may find upon the line of said work, and to procure other material for its completion, and charge the expense of the said labor and materials to Contractor, to be deducted from any moneys due him under contract; and in case such expense shall exceed the sum which would have been payable under contract, if the same had been completed by said Contractor, he shall pay the amount of the excess to the Board of Freeholders, on notice of the excess so due from the Engineer.

Personal attention to work.

The Contractor must give his personal attention to the work, and not assign or sublet the same, but keep the same under his control.

Contractor to insure payment for labor, materials, &c.

The Contractor must also furnish the Board of Freeholders with satisfactory evidence that all persons who did work or furnished materials for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents in the prosecution of the work, have been fully paid and secured; and shall also give notice to said Engineer and Supervisor, within ten days after the completion of the work, that any balance for such work or materials, or compensation for such damage still due, have been fully paid.

Incompetent workmen.

The Contractor shall employ competent men to do the work, and whenever the Supervisor shall inform him in writing that any man on the work is unfitted for the place or is working contrary to the provisions of the specifications or the instructions of the Engineer, he shall thereupon be discharged.

Safeguards.

The Contractor must, during the performance of the work, provide all proper safeguards, lights or barriers, &c., for the prevention of accident or injury to persons and property, and must also indemnify and save harmless the said Board of Freeholders from any suit for damages by reason of any negligence on his part to make such provisions.

Obstruction of roadway.

The Contractor must also preserve the roadway on which he is working from needless obstruction, and where necessary will construct safe and commodious crossings, to be maintained in good order, and to afford all proper and reasonable means for the accommodation of the public.

Prices to be paid for work.

Bids under these specifications will be received as follows:

Per square yard for				inch Telford, road complete.			
"	"	"	"	"	"	"	"
"	"	"	"	"	Macadam "		"
"	"	"	"	"	"	"	"

For any greater depth or thickness, a price per square yard for every additional inch in excess of inches.

Price per cubic yard for earth excavations in excess of twelve inches average in one continuous excavation.

For carting earth per cubic yard in excess of one-half mile, for each half mile of excess.

For clay or gravel per cubic yard for shouldering or binding, to include hauling and placing when not obtained along the road, within its legal width.

For underdraining, furnishing all labor and material, per lineal foot.

The Contractor in the preparation of the road-bed or side ditches shall not be required to excavate to a greater depth than twelve inches on the average in any one continuous excavation, nor to remove the earth therefrom to a greater distance than one-half mile, nor to furnish and use gravel or clay for shouldering or binding when not obtainable along the line of the road, except under bids as above.

Each bid must be accompanied by cash, certified check or satisfactory bond for thousand dollars as a guarantee of good faith on the part of the bidder. Contractor's bond.

The person or persons to whom this contract shall be awarded will be required to give bonds as security for his faithful performance of the several requirements of these specifications to the amount of one-half of the estimated cost of said road, and the securities to be satisfactory to the Board of Freeholders.

The road as specified herein shall be completed on or before months from date of contract and kept in good condition for one year from date of completion. It being expressly understood that the measurement shall be taken after the entire completion of each class of work, and the aforesaid prices cover the furnishing of all the different materials, excavation and labor and the performing of all work necessary under these specifications; and also that no payment shall be made for work or materials except upon certificate of the Supervisor and Engineer, and that no allowance is to be made for any extra work of any kind or nature, unless the price shall be agreed upon between the contracting parties and endorsed upon the agreement and witnessed by Engineer. Completion of contract.

——— ———,
County Engineer.

Approved this ——— day of ——— A. D. 189—, by resolution of the Board of Chosen Freeholders.

——— ———,
Director Board of Chosen Freeholders.

——— ———,
Clerk of Board of Chosen Freeholders, ——— County.

OFFICE STATE COMMISSIONER PUBLIC ROADS,
TRENTON, N. J.

I have this day carefully read and examined the foregoing specifications, and the same are hereby approved.

Given under my hand this ——— day of ——— A. D. 189—.

——— ———,
State Commissioner of Public Roads.

Specifications for a Gravel Road, Prepared by J. J. Albertson, C. E., Magnolia, N. J.

Used in the Construction of the Hammonton and Absecom Road, 22 Miles Long.

PREPARATION OF ROAD BED.

The Contractor is to remove from the road-bed to the width of 30 feet, or from curb-line to curb-line, all material objectionable to the Engineer, such as trees, stumps, roots, brush, etc., at least 25 feet from center line of road, then the road is to be excavated or built, as the case may be, and prepared to receive a gravel bed 14 feet wide, the sub-grade of which is to slope 5 inches from center to shoulder.

The Contractor is to grade the road, where the Engineer so directs, to conform to the profile furnished by the Engineer, and approved by the Board of Chosen Freeholders and the State Commissioner of Public Roads, to the width of thirty feet.

The curvature or slope from center or crown of road to sides or curb lines being 1 in. fall to each foot.

The shoulders or sides to the width of 8 feet, composed of the local earth, are to be plowed and sloped to conform to the final surface and curvature of road when finished.

In the preparation of the road-bed the Contractor will not be required to excavate to a greater depth than 12 in. on an average in a continuous cut, the whole width of the road, without extra pay, at prices per cubic yard named in accepted bid; no payment allowed when the gravel taken from cut is used in surfacing road and then measured.

Any excavation of a less depth than that just named must be done by the Contractor without extra pay, and to be included in his price named for the "preparation of road-bed."

All the above items are to be included under one head, styled "Preparation of Road-Bed," and to be bid upon as one item and paid for in one sum as such, by the lineal foot, at price named in accepted bid.

TILE DRAINING.

When, in the judgment of the Engineer and Supervisor, any underdraining is required, the Contractor is to furnish material and construct a 4 in. sole tile drain, in a good workmanlike manner, on a yellow pine board 1 in. in thickness and at least 6 in. wide. The top of the tile is to be at least 2 feet 6 inches below surface of finished road. The joints of the tile to be covered with meadow hay. The ditch is then to be covered with pervious earth. The completed drain is to be paid for by the lineal foot at prices named in accepted bid.

MATERIAL.

The Road Committee, in conjunction with the Engineer, subject to the approval of the Board, will locate all gravel to be used in the surfacing of this

road, and the said Board will pay for all this gravel when the same is not donated, without any cost to Contractor.

The Contractor is to dig, cart and place upon the road in accordance with the specifications, the gravel selected and to use no other gravel.

Should any objectional material be used he is to remove the same at his own expense.

The gravel is to be placed upon the road in one layer, then to be thoroughly harrowed, mixed and rolled with roller approved by Engineer, until it is thoroughly consolidated and firm. One layer of sufficient thickness that when it is thoroughly rolled and solidified that the solid gravel will be 8 in. deep in the center and slope at a regular grade to 6 in. in depth at a distance of 7 feet on each side of the center line of road. Should any inequalities appear during the rolling, these are to be carefully filled with gravel so that the finished road will conform to the approved profile; no extra pay will be allowed for material required to fill up these depressions.

The Contractor is to be paid by the cubic yard for the compacted gravel that he puts on the road and to be measured on the road after it is thoroughly rolled, at the price named in the accepted bid, which is to include the loading, carting, spreading, mixing, harrowing and finishing the road and shaping the local earth shoulder.

SIDEWALK.

The Contractor will also be required, when the Engineer so directs, to grub and remove from sidewalk or strip of land 10 feet wide on outside of curb-lines, all material objectionable to the Engineer, such as trees, stumps, roots, brush, etc., thereby completing the opening of the entire road to the width of 50 feet which will be 25 feet on each side of the center line.

The grubbing and removing of such objectionable material to be done and measured only where the Engineer and Supervisor shall order. The same to be paid for by the acre for the land actually grubbed at prices named in the accepted bid.

CARTING GRAVEL.

The Contractor will not be required to cart any gravel a greater distance than one-half mile without extra pay, for each extra half mile of carting or fraction thereof, at a price per cubic yard named in his accepted bid.

All gravel used for surfacing found within one-half mile of the place where it is to be used, whether on the line of the road or not, must be carted without extra pay.

On certain sections of the road when the gravel is found just where it is wanted, and does not require (in the judgment of the Engineer) to be loaded and carted, no allowance will be made for the same, other than the price per lineal foot accepted for "The Preparation of the Road-bed" and no other pay for the graveling, rolling or placing the same will be allowed.

There are sections of this road which do not, in the judgment of the Engineer, require any "Preparation of the Road-bed," but do require a coat of gravel, which shall be applied when ordered by the Engineer in the manner already specified, and to a depth by him to be named, and measured when compact

and paid for at same price per cubic yard as other gravel furnished under these specifications.

STRIPPING GRAVEL BEDS.

Some of the gravel beds are covered with objectionable surface material which must be first removed by the Contractor, and deposited where the Engineer so directs, and to be paid for by the county at a price per cubic yard named in accepted bid for removing or stripping such objectionable material from top surface of gravel bed. No allowance will be made for removing stumps, trees, brush or roots from gravel pit.

OPEN DITCHES.

The Contractor is to grade the shoulders and open all necessary side ditches (as per stakes furnished by the Engineer) so that there will be no water allowed to stand by the side of the road or on it. The open ditches are to be paid for by the cubic yard as excavations, at the prices named in accepted bid.

EXTRA DEEP.

Should the committee so order, the Contractor is to build in all other respects as already specified, the gravel-bed to a greater depth or thickness than that already named. The Contractor is to do the same at a price named per square yard for each extra inch in depth.

EXTRA WORK.

No extra work will be paid for unless the price has been agreed upon between the contracting parties, and endorsed upon the agreement, witnessed by the Engineer.

Bids shall be accompanied by cash, certified check or approved bond, to insure the execution of the agreement, to the amount of at least $1,000.

Bids will be received under these specifications as follows:

1. Price per lineal foot for the preparation of the road-bed.
2. Price per acre for grubbing and removing objectionable matter from sidewalks.
3. Price per lineal foot for completed tile drain.
4. Price per cubic yard for excavating open ditches by side of road.
5. Price per cubic yard for excavations on an average in excess of 12 inches in one continuous cut in preparation of road-bed.
6. Price per cubic yard for compacted gravel 14 feet wide, as specified.
7. Price per square yard for each ordered inch in depth in excess of thickness named.
8. Price per cubic yard for carting gravel more than one-half mile and each additional half mile or fraction thereof.
9. Price per cubic yard for stripping or removing earth from top of gravel bed.

The person bidding the lowest on the aggregate of the above nine propositions will be considered the successful bidder (all other things being equal), and no bid will be considered unless it names a separate price on each one of the nine foregoing propositions and also states to which of the four sections of the road it is intended to apply.

LIABILITIES OF CONTRACTOR.

1. He shall keep up sufficient guards by day and night to prevent accidents from travel, and will be liable for any damage which may arise by his neglect to do so.

2. He is to make good any defects which may appear in said road for one year after its completion and final acceptance by the Board, and shall be liable for wear and tear caused by ordinary travel upon the road within one year after its acceptance.

3. He is to commence upon the road at such points as may be directed by the Engineer and Supervisor within thirty days from and after signing the contract, and shall continue work thereupon until completion, except as herein provided.

4. He further agrees to complete the same on and before the first day of May, A. D. 1897, under a penalty of twenty dollars per day, except only to the provisions herein contained, unless otherwise agreed upon by the Board of Chosen Freeholders, on certificate of the Engineer recommending the same, and shall receive a bonus or premium of one dollar per month for each month the work is completed before the specified time expires.

5. At least twenty per cent. of the entire cost of the road shall remain in the hands of the Board of Chosen Freeholders until the expiration of the terms of the contract, and until the road shall have been finally accepted by the Engineer and the Board of Chosen Freeholders, and five per centum of the entire cost of the road shall be retained by said Board until one year after the final acceptance of the road, part or all of which may be used by said Board to make any repairs that the Engineer, in conjunction with the Road Commmittee, may deem necessary, should the contractor neglect or refuse to attend to the same within ten days after due notice, and the amount expended to be deducted from balance due the contractor.

ENGINEER.

Engineer is to be selected or appointed by the Freeholders and paid by them He is to furnish all surveys, profiles and specifications, and should any difference arise between the contracting parties as to their meanings, his decisons on these matters are to be final and conclusive. The work is to be done according to his direction, and if any material is brought upon the road not approved by him, it is to be removed at the expense of the Contractor. No work or material is to be paid for without a certificate from the Engineer and Supervisor that it is done, and is fully up to the requirements of these specifications.

RIGHTS TO BUILD BRIDGES, CULVERTS, &C., AND SUSPENSION OF WORK.

The right of the county to build bridges, culverts, or lay pipes or other appurtenances in connection therewith, in said road or avenue during the progress of the work, is expressly reserved, as well as suspending the work, or any part thereof, during the construction of the same for the purpose above stated, without further compensation to the Contractor for such suspension than an extension of time for completing the work as much as it may have been delayed by such suspension.

STOPPING WORK ON ACCOUNT OF WEATHER.

The Supervisor, in his discretion, may stop any portion of the work, if in his judgment the weather is such as to prevent the same being done properly. No allowance of any kind will be made for such stoppage except an extension of the time for completion of the work, as herein provided for.

ABANDONMENT OF CONTRACT.

If at any time the work under contract should be abandoned, or if at any time the Supervisor should judge and so certify in writing that the said work or any part thereof is unnecessarily delayed, or that the Contractor is willfully violating any of the conditions or covenants of this contract, or is executing the same in bad faith, the Board shall thereupon notify the said Contractor to discontinue all work under this contract, and may employ parties to complete the work in such a manner as they may decide and use such material as they may find upon the line of said work and to procure other material for its completion; and charge the expense of the said labor and material to the Contractor, to be deducted from any moneys due him under contract, and in case such expenses shall exceed the sum which would have been payable under contract, if the same had been completed by said Contractor, he shall pay the amount of the excess to the Board of Freeholders, on notice of the excess so due from the Engineer.

SUPERVISOR.

Nothing in these specifications relating to the duties of the Engineer shall be taken or construed to in any manner conflict with the duties of the Supervisor in the performance of his duties, as specifically set forth in the act entitled, "An act to provide for the permanent improvement of the public roads in this State," approved March 22d, 1895, and the supplement thereto, but they shall co-operate as far as practicable.

ESTIMATES.

The estimate for the work to be done on the roads above named under these specifications, is as follows:

Twenty-two miles of completed gravel road, at $ per mile.

BOND OF CONTRACTOR.

The bond to be given by the Contractor for the faithful performance of the work mentioned and set forth in these specifications and the agreement accompanying the same, shall be such sum as the Board of Freeholders shall decide, and not less than 50 per cent. of the cost of the road when completed.

CONTRACTOR TO INSURE PAYMENT FOR LABOR, MATERIAL, &C., ON FINAL ESTIMATE.

The Contractor must also furnish said Engineer and Supervisor with satisfactory evidence that all persons who did work or furnished materials for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents, in the prosecution of the work, have been fully paid and secured; and shall also give notice to said Engineer and Supervisor within ten (10) days after the completion of the work, that any balance for such work or materials, or compensation for such damage still due, has been fully paid or released.

J. J. ALBERTSON, *C. E.*

Approved.

——— ———, *Director.*

Attest:

——— ———, *Clerk.*

Appendix B.

Following is the text of the State Aid Road Law, with its amendments:

CHAPTER CCXXIII.

An Act to provide for the permanent improvement of public roads of this state.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That whenever the board of chosen freeholders of any county in this state shall, by resolution, have declared their intention to cause any particular road, or section thereof, within such county to be improved under the provisions of this act, such board shall cause all necessary surveys to be made and specifications to be prepared; the specifications shall require the construction of a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good materials, in such manner that the same, of whatever materials constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel; shall be so prepared as to call for bids from which an approximate estimate of the cost can be ascertained, and shall state the amount of security that will be required of the bidder; after said specifications shall have been prepared they shall be submitted to the board of chosen freeholders for their approval or rejection; and, if such board shall approve them, they shall then be submitted to the state commissioner of public roads for his approval or rejection; it shall be the duty of the commissioner of public roads, before approving the specifications for any road so submitted to him, to ascertain, by personal

Board of freeholders may cause road to be improved.

What specifications require.

How prepared.

Freeholders to reject or approve.

Commissioner to examine road and approve specifications.

examination or otherwise, the natural character of the soil upon which such road is proposed to be constructed, and all other facts that he may deem important, and if, after examination of the specifications and facts so ascertained, he shall be of the opinion that the specifications provide for the construction of a road that will, with reasonable repairs thereto, be firm, smooth and convenient for travel at all seasons of the year, and if he shall also be of the opinion that one-third of the cost of constructing the road or section of road to which such specifications relate, together with one-third of the cost of constructing all other roads and sections of roads in this state under specifications previously approved by him, will not in any one year exceed the sum of one hundred thousand dollars, then he shall approve the specifications, but otherwise he shall reject them; *provided, however*, that he shall, in his discretion, have the power to withhold his approval of any specifications, to the end that the estimated aggregate amount of contracts made in any one year shall not exceed the sum of three hundred thousand dollars, and also to the end that the amounts paid out of the state treasury under the provisions of this act shall in each year be distributed amongst the several counties of the state in such manner as to the said state commissioner of public roads shall seem fair and equitable, and any specifications, the approval of which is withheld as aforesaid, may, if otherwise satisfactory to the said state commissioner of public roads, be approved by him in any year subsequent to the one in which the same may be presented for approval as aforesaid; if the board of chosen freeholders and the state commissioner of public roads shall both approve such specifications, it shall then be the duty of the director of the board of chosen freeholders to advertise in at least two daily newspapers, printed and circulating in the county, for the period of two weeks, or in at least two weekly newspapers, printed and circulating therein, for at least four weeks, for bids to do the work according to the specifications prepared; such advertisements shall state where bidders may find the specifications and shall name a time and place where the board of chosen freeholders, or a committee of

Cost of all roads not to exceed 33⅓ per cent.

May withhold his approval.

Distribute among the counties.

When approved, freeholders must advertise for bids.

five members thereof, of whom the director shall be one, will meet to receive bids; every such bid shall be accompanied with the bidder's bond in the sum of one thousand dollars, with security satisfactory to the board, conditioned that if the contract shall be awarded to him he will, when required by the board, execute an agreement in writing to perform the work according to the specifications; no bids shall be received by the board or any member thereof, or by said committee or any member thereof, except at a meeting of said board or a committee, of which notice shall be given as aforesaid, and all bids then received shall be immediately publicly read; if the bids shall be received by a committee of the board they shall be reported to the board at the next meeting thereof, with the recommendations of the committee; the board may reject all bids if, in their opinion, good cause exist therefor, but otherwise they shall award the contract to the lowest bidder who shall give satisfactory evidence of his ability to perform the contract; *provided, however*, that the estimated amount of contracts awarded in any one year by any board of chosen freeholders, together with the estimated cost of repairs of roads already constructed, shall not exceed one-fourth of one per centum of the ratables of the county as reported to the state comptroller for the last preceding year; *and provided further*, that in every contract made as aforesaid it shall be specified that at least five per centum of the contract price shall not be paid to the contractor within the period of one year after the work specified to be done by such contract shall have been fully performed and accepted; the bidder to whom the contract may be awarded shall, in addition to executing the agreement to perform the work according to the specifications, also execute to the board of chosen freeholders a bond conditioned for the faithful performance of the contract, in the sum specified in the advertisement for bids, and with such sureties as the board may approve; the contract shall, on behalf of the board of chosen freeholders, be executed by the director thereof, and, when executed by the bidder and said director, a copy of the contract and specifications, with the estimated cost of the work, shall be forthwith filed with the state commissioner of public roads.

Committee to receive bids.

Bidders must give bond.

Bids, how received.

Limit of county expenditures.

Five per centum to be retained by county.

Contractors must give bond.

Copy of contract and specifications filed with state commissioner.

Commissioner must appoint supervisor.

2. *And be it enacted*, That after a copy of the contracts and specifications shall have been filed with the state commissioner of public roads as aforesaid, the said state commissioner of public roads shall, as soon as practicable, appoint a supervisor of the construction of the work under such contract, who shall receive for his services under this act three dollars per day, to be paid out of the county treasury; if the work for which such contract shall be made shall have been petitioned for, pursuant to the provisions of the eighth section of this act, then, if the petitioners therefor, or

Property owners nominate supervisor.

any of them, shall in writing nominate to the said state commissioner of public roads one or more persons for the position of such supervisor, it shall be the duty of said state commissioner of public roads, if only one nomination be made, to appoint as such supervisor the person so nominated, and, if more than one nomination be made, to appoint as such supervisor one of the persons so nominated, and if no such nomination be made, the said state commissioner of public roads shall then appoint as such supervisor any person whom he may consider competent for such position; the

Commissioner may remove supervisor.

said state commissioner may, however, at any time summarily discharge any supervisor who, in the judgment of the state commissioner, is incompetent or who neglects his duty, and, in such case, shall appoint a new supervisor to take the place of the one so discharged; the supervisor shall supervise all work done under the contract, shall give his whole

Supervisor must give his full time to the work.

time thereto, shall require the provisions of the contract to be strictly adhered to by the contractor, and, in any case where the contract provides for partial payments during the progress of the work, he shall also, as each payment becomes due and before payment shall be made, present to the

Supervisor must certify payments.

board his certificate, and also the certificate of the surveyor or engineer, if any there be, stating as near as may be the total amount of work done, and that such work has been done in all respects as required by the contract; and the board shall thereupon direct payment to be made by the county collector; *provided*, that no partial payment made during the progress of the work shall exceed eighty per centum of the estimated value of the work done; the board

shall have power to borrow on temporary loans on the credit of the county such sums of money for the purpose of carrying on such work as may from time to time become necessary; and when the work shall have been fully completed, and the terms and conditions of the contract shall have been fully complied with, and such facts shall have been certified to the board to their satisfaction by the supervisor and the surveyor or engineer, if any there be, payment in full shall be made, less the amount required to be withheld for the period of at least one year, as in the next preceding section specified.

Freeholders may borrow money temporarily.

3. *And be it enacted*, That when the work under any contract shall have been fully completed, it shall be the duty of the supervisor to prepare a detailed and itemized statement in duplicate of the cost of the improvement, one copy whereof shall be filed with the board of chosen freeholders and one with the state commissioner of public roads.

Supervisor to prepare final certificate.

4. *And be it enacted*, That one-third of the cost of all roads constructed in this state under this act shall be paid for out of the state treasury; *provided*, that the amount so paid shall not in any one year exceed the sum of one hundred thousand dollars; if one-third of such cost shall appear by the statements filed in any one year with the state commissioner of public roads to exceed the said sum of one hundred thousand dollars, then, and in such event, the said sum of one hundred thousand dollars shall be apportioned by the governor and the state commissioner of public roads amongst the counties of the state in proportion to the cost of roads constructed therein for such year, as shown by the statements of costs filed in the office of the state commissioner of public roads; the governor and said state commissioner of public roads shall, between December fifteenth and thirty-first in each year, certify to the state comptroller the amount to be paid to each county for such year, and the state comptroller shall thereupon draw his warrants in favor of the respective county collectors for the sums certified as aforesaid upon the state treasurer, who shall pay the same out of any moneys in the state treasury not otherwise appropriated.

State to pay one-third cost.

Total state appropriation.

Allotment to be made before December 31st.

Comptroller to draw warrants.

Board of freeholders to certify costs to assessors.

5. *And be it enacted*, That on or before September first in each and every year it shall be the duty of the board of chosen freeholders to certify to the county board of assessors, either in the annual tax budget or separately, two-thirds of the estimated cost of all work for which contracts shall have been awarded under this act during such year; and the county board of assessors shall include the sum so certified in the county taxes assessed for such year, and the same shall be assessed, collected and paid over to the county in the same manner and within the same time that other county taxes are assessed, collected and paid over; if a deficiency shall exist in consequence of the cost exceeding the estimate, or in consequence of the receipt of less than one-third of the cost from the state treasury, the board of chosen freeholders shall have authority to borrow on temporary loans to the amount of such deficiency until the next annual taxes shall be assessed, collected and paid over to the county; and if there be a surplus, in consequence of the cost being less than the estimate, such surplus shall be retained and used in the construction of other roads under this act, or in repairs to roads constructed under this act.

Deficiency, how met.

Two-thirds less one-tenth.

6. *And be it enacted*, That instead of certifying to the county board of assessors two-thirds of the estimated cost of all work for which contracts shall have been awarded under this act in any one year as required by the fifth section of this act, or two-thirds of said estimated cost less one tenth of said estimated cost as required by the eighth section of this act, the said board of chosen freeholders may, if a resolution to such effect shall be adopted by a vote of at least two-thirds of all its members, borrow such sum or sums of money as may be necessary for the payment of such proportion of said estimated cost by the sale of the bonds of such county, issued in the name of the board of chosen freeholders thereof, and in such sums as the said board may deem proper; said bonds shall bear interest at a rate not exceeding five per centum per annum, shall be sold at not less than their par value, shall not exceed in the aggregate the proportion of the estimated cost of such road as hereinabove mentioned, shall be so divided that one-tenth of the amount of the

Bonds, how sold.

proportion of said estimated cost shall fall due in one year from their date, and one-tenth of the proportion of said estimated cost in each successive year thereafter for the period of ten years after their date, and shall be either coupon or registered bonds, as the board of chosen freeholders may determine; the principal and interest thereof shall be made payable at the office of the county collector of such county; said bonds shall be signed by the director of said board and the county collector, and shall be sealed with the seal of the county, and the county collector shall keep a record thereof; it shall be the duty of the board of chosen freeholders each year to place in the tax levy for such county in each year, so long as said bonds shall run, a sufficient sum to pay the interest accruing thereon for said year and the principal of the bonds that shall mature in said year.

When to mature.

Record to be kept.

7. *And be it enacted*, That any road constructed under the provisions of this act, except within the limits of any city, shall forever thereafter be a county road, and the duty of keeping the same in repair, except within the limits of any city, shall devolve upon the board of chosen freeholders and the county supervisor hereinafter mentioned, and all other powers and duties respecting such roads, except within the limits of any city, shall be imposed upon and vested in the said board of chosen freeholders to the exclusion of all township, borough or other municipal officers excepting city officers; after the first road shall have been constructed under this act in any county, it shall be the duty of the board of chosen freeholders thereof to appoint a county supervisor of roads who shall hold his office for three years and until his successor is appointed, shall give bond to the board of chosen freeholders in the sum of one thousand dollars conditioned for the faithful performance of the duties of his office with such sureties as the board may approve, and shall receive such salary or allowance as the board may fix; the board of chosen freeholders shall provide all moneys necessary to keep in a proper state of repair the roads constructed under this act, except within the limits of any city, and may, if there be no moneys on hand that can be lawfully used for such repairs, borrow therefor on temporary loans

County road, township rights acquired.

County supervisor, when appointed.

Compensation to be fixed.

Duties of.

County to borrow by temporary loans.

until the next annual taxes shall have been assessed, collected and paid over to the county; it shall be the duty of the supervisor to report to the board of chosen freeholders, or to the road committee thereof, all repairs he may think necessary or proper to be made to such county roads, and, under the direction and control of said board of chosen freeholders or its road committee, to expend the moneys raised for such repairs in such manner and upon such portions of the roads as will tend to keep them in the best possible state of repair; no part of said moneys shall be paid into the hands of the supervisor, but all expenses of repairs shall be paid by the county collector on the orders of the board of chosen freeholders, granted only on the presentation of bills verified by affidavit, as now required by law in the case of other claims against the county; if the board of chosen freeholders shall neglect or refuse to make appropriations sufficient to keep any such road as aforesaid in good repair, any citizen of the county may apply to the supreme court for a writ of mandamus to compel said board to make an appropriation as aforesaid; and when any such application is made, the court, upon a rule to show cause or otherwise, in such manner as the court shall prescribe, shall ascertain and determine whether such road as aforesaid is in a proper state of repair, and may also, in its discretion, allow to the attorney of the applicant a reasonable counsel fee to be paid by the county; in case the board of chosen freeholders shall not have on hand sufficient moneys out of which to make the appropriation commanded to be made by any writ of mandamus granted as aforesaid, they shall borrow such sum or sums as may be necessary therefor on temporary loans on the credit of the county, and shall require the amount so borrowed to be raised by taxation with the next assessment of county taxes; it shall be the duty of the authorities of any city within which any portion of road may be constructed under the provisions of this act to keep the portion thereof within such city in repair forever after such construction, and such city shall have the same power, authority and jurisdiction over such portion of such road, and shall have imposed upon it the same duties as were imposed upon and vested in it with

Money, how expended.

County collector to make all payments.

Neglect to repair.

Freeholders to be mandamused.

Portion of road within city limit to be kept in repair by the city.

respect to such portion of such road before its improvement under the provisions of this act.

Petition, how signed.

8. *And be it enacted*, That whenever there shall be presented to the board of chosen freeholders of any county a petition signed by the owners of at least two thirds, either in lineal feet or in area, of the lands and real estate fronting or bordering on any public road or section of road in such county, taking in said estimate of area all the lands of every such owner which are assessed for taxes in said county and which lie together in any farm, tract or lot of which a part has a frontage on said road or section of road, praying the board to cause such road or section to be improved under this act, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting or bordering on said road or section shall be assessed thereon in proportion to the benefits conferred to an amount not exceeding ten per centum of the entire cost of the improvement, it shall be the duty of the board to cause such improvement to be made; *provided*, that the road or section desired to be so improved shall be at least one mile in length, or, if it be less than one mile in length, shall be an extension of or connection with some other permanently improved or paved road or street; *and provided, further*, that the estimated cost of all improvements made under this act, together with the estimated cost of repairs of roads already constructed in any county in any one year shall not exceed one-fourth of one per centum of the ratables of such county for the last preceding year; *and provided, further*, that where more roads are applied for than can be constructed under this act in any one year, the said boards of chosen freeholders shall have the power and authority to select from the roads petitioned for the ones first to be constructed, having regard to the most important roads and the distribution of the benefits of this act to all parts of their counties; it shall not be necessary for the board in any such case to declare by resolution their intention to cause such improvement to be made, but they shall forthwith cause all necessary surveys of such road or section to be made, and specifications to be prepared for a macadamized road, or a telford or other stone road, or a

Lineal feet or area.

Length of road.

If less than one mile.

Estimated cost not to exceed one fourth of one percentum of ratables.

Board of freeholders to select road under certain circumstances.

Must cause surveys to be made and specifications prepared.

Stone or other good material to be used.

road constructed of gravel, oyster shells or other good material, in such manner that the same, of whatever materials constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel; the proceedings shall thereafter be the same as is hereinbefore required in cases where such intention has been declared; if the specifications shall not be approved by the board or by the state commissioner of public roads, or if all the bids for the work shall be rejected, it shall be the duty of the board to cause other specifications to be prepared, or re-advertisements for bids to be made, as often as may be necessary and until a contract shall be awarded, to the end that the improvement prayed for may be completed with reasonable speed; *provided, however*, that no re-advertisement need be made where the lowest bid submitted shows that the improvement prayed for cannot be made within the limit of expenditure in this section above mentioned; in every case where a contract shall be awarded after the presentation of such petition as aforesaid, the board of chosen freeholders, instead of certifying to the county board of assessors two thirds of the estimated cost of the work as prescribed by the fifth section of this act, shall, unless they determine to issue bonds in the manner prescribed by the sixth section of this act, which they are hereby authorized to do, certify two-thirds of said estimated cost less one-tenth of said estimated cost, which sum the county board of assessors shall include in their assessments of county taxes.

When specifications are not approved or bids rejected.

Other specifications to be made.

No re-advertisement necessary.

After contract awarded, board to certify two-thirds estimated cost, less one-tenth, to assessors.

9 *And be it enacted*, That when the improvement prayed for as aforesaid shall have been completed and the statement of the cost thereof filed with the board of choosen freeholders, as prescribed by the third section of this act, said board shall apply to the circuit court of the county for the appointment of commissioners to estimate and assess the peculiar benefits conferred by such improvement upon the lands and real estate fronting or bordering on the road or section thereof improved, of the time and place of which application notice shall be given by ten days' publication in two daily newspapers printed and circulating in the county, or by two weeks' publication in two weekly newspapers

Commissioners to estimate benefits, how appointed.

To give notice of appointment of.

printed and circulating therein, at which time and place or at such other time and place as the court shall designate, said court shall, without unnecessary delay, appoint three commissioners who shall be disinterested freeholders and residents of the county in which the application is made, to estimate and assess the benefits aforesaid; the said court shall have power to remove any commissioner and appoint another in his place and also to fill any vacancy that may occur in the office of any commissioner from any cause; said commissioners shall each receive three dollars per day, to be paid by the county collector.

Court to appoint and remove commissioners

Compensation of.

10. *And be it enacted*, That said commissioners, before entering upon the duties required of them by this act, shall take and prescribe before some person duly authorized to administer the same an oath or affirmation that they will make all assessments and estimates required of them fairly, legally and equitably according to the best of their skill and understanding, which oath or affirmation shall be attached to the report that they are hereinafter required to make.

Oath of commissioners.

11. *And be it enacted*, That the said commissioners, having thus qualified, shall give such notice as the court may direct of the time and place when and where they will hear any persons in interest who may present themselves to be heard, and at such time and place and at such other times and places to which they may adjourn for that purpose the said commissioners shall attend, and shall give a public hearing to those persons in interest who may desire to be heard; the said commissioners shall have power to examine witnesses under oath or affirmation, to be administered by any one of them, and to enter upon and view the lands and real estate fronting or bordering on the road or section thereof improved, and to adjourn from time to time in their discretion, or as directed by said court; they shall use diligent efforts to ascertain the names of the owners of the lands fronting or bordering on the road or section thereof improved, and shall state the same in the report hereinafter mentioned; but the failure to ascertain the name of any owner, or to state the same correctly, or the omission of any such name from the report, shall not invalidate said assessment nor be a bar to the collection of the same.

Commissioners to give public hearing of time of meeting.

Commissioners to report in writing.

12. *And be it enacted*, That after having given opportunity as aforesaid for a public hearing of the persons in interest, and having viewed the lands fronting or bordering on the road or section thereof improved as aforesaid, the said commissioners shall make a report in writing of their estimates and assessments to the said court, accompanied by a map prepared by the engineer in charge of the construction of the road, showing the several tracts or parcels of lands and real estate fronting or bordering on said road or section thereof; the said report shall state the cost of the whole work, which shall be furnished to the commissioners by the board of chosen freeholders from the report of the supervisor of construction filed with said board under the requirements of the third section of this act, and shall give the names, so far as ascertained, of the owners of the tracts or parcels of lands and real estate fronting or bordering on said road or section thereof, the city, township, borough or other municipality in which each tract or parcel of land is situate, and the amount of the assessment upon the owner or owners of each of said tracts or parcels of land and real estate for the said benefits; which several assessments shall be in proportion, as near as may be, to the peculiar benefits deemed to have been conferred by said improvement upon the respective tracts of land and real estate aforesaid; if any tract of land shall be located in more than one city, township, borough or other municipality, it shall be stated in said report as being in the city, township, borough or other municipality in which there is the greatest frontage by lineal feet on the road or section thereof improved; in no case shall any tract or parcel of land and real estate, or any owner thereof, be assessed beyond the amount of benefit actually derived from said improvement, nor shall the aggregate amount of assessments imposed upon the tracts or parcels of land fronting or bordering on such road or section thereof exceed ten per centum of the total cost of the improvement.

Map made by engineer in charge of the road.

Names of property owners required.

Location of tracts of land.

Court to give notice of hearing.

13. *And be it enacted*, That upon the coming in of any such report signed by the said commissioners, or any two of them, said court shall cause such notice to be given as it

shall deem proper of the time and place of hearing any objections that may be made to such assessment, and after hearing any matter that may be alleged against the same the said court, either by rule or order, shall confirm the said report, or shall refer the same to the same commissioners for revision and correction, or to new commissioners to be appointed by the said court forthwith to reconsider the subject-matter thereof, and the said commissioners to whom such report shall be so referred by the court shall return the same corrected and revised, or a new report to be made by them in the premises, to the said court without unnecessary delay, and the same, being so returned, shall be confirmed, or again referred by the said court in the manner aforesaid, as right and justice shall require, and so, from time to time, until a report shall be made or returned in the premises which said court shall confirm; such report, when so confirmed, shall be final and conclusive, as well upon the said boards of chosen freeholders and the cities, townships, boroughs or other municipalities in which said lands may be situate, as upon the owners of any lands and real estate affected thereby, and the court shall require the same to be forthwith filed with the county clerk, and certified copies thereof and of the accompanying map, and of the rule or order confirming the report, to be promptly delivered to the county collector, one for said county collector and for each city, township, borough or other municipality in which the assessed lands may lie; the county collector shall retain one of the said copies for his own use and shall forthwith give one to the collector or receiver of taxes in each of the cities, townships, boroughs and other municipalities in which the assessed lands may lie; each city, township, borough or other municipality whose collector or receiver of taxes shall receive such certified copy shall, by its proper disbursing officer, within six months after the date of the said order of confirmation, pay the amount of assessments appearing by said report to have been assessed upon the lands situate in such city, township, borough or other municipality, who shall receive for his services three per centum of the money so collected, to be paid by the county.

Court may order new report

When report is confirmed shall be final and conclusive.

File with county clerk.

Copies to county collector and townships, &c.

Township to collect in six months.

No certiorari allowed.

14. *And be it enacted*, That no certiorari shall be allowed by any court to review any of the proceedings in relation to such improvement, nor in any way to affect any assessment made by such commissioners, after the lapse of thirty days from the making of the order of the court confirming such assessment; the court shall designate what notice, if any, shall be given by publication or otherwise of the confirmation of the report of said commissioners.

Assessments to remain a lien on the property.

15. *And be it enacted*, That the assessments made by said commissioners shall be and remain a lien upon the lands assessed, from the date of the confirmation of the report of assessments in the same manner and to the same extent that taxes are liens upon lots or tracts of lands situate in the city, township, borough or other municipality in which the assessed lands may be.

Collector to notify owners of lands.

16. *And be it enacted*, That the receiver or collector of said city, township, borough or other municipality shall, as soon as the said report is delivered to him, give to the owners of lots and tracts of lands appearing by said report to be assessed, such notice of the assessments and of the time within which the same are required to be paid as the court in its order of confirmation, hereinabove mentioned, shall prescribe; all such assessments shall become due and payably to such receiver or collector within six months from the date of the order of confirmation hereinabove mentioned.

Township, &c., to bring suits for collection of assessments.

17. *And be it enacted*, That if any assessment upon any lot or tract of land made under the provisions of this act shall not be paid within the time appointed in said notice, the township committee, common council or other governing body in the city, township, borough or other municipality within which such lot or tract of land shall be situate, or a majority of them may, as they shall deem proper, either bring an action on contract in any court of competent jurisdiction, in the corporate name of such city, township, borough or other municipality, against the owner or owners of such lot or tract of land for so much money laid out and expended by them for the use of such owner or owners and declare generally, and give the special matter in evidence, and either party from any judgement rendered therein may

Either party may appeal.

have the same remedy by appeal or otherwise as if said parties were private individuals, or they may proceed to collect the said assessment by sale of the lot or tract of land whereon such assessment has been imposed, or may be a lien, in the same manner and to the same extent as lands are now sold for unpaid taxes in such city, township, borough or other municipality, and the purchaser or purchasers at any such sale or sales, and his legal representatives, shall hold and enjoy such lot or tract of land, with the rents, issues and profits thereof, in the same manner and by the same title and tenure as purchasers at the sales of lots or tracts of land for unpaid taxes can now hold and enjoy the same in such city, township, borough or other municipality.

Assessment to be a lien upon the lands and sold as lands are now sold for taxes.

18. *And be it enacted*, That if any property owners or owner along any road in any county of this state which has not been improved, or is not undergoing improvement, under the previous sections of this act, shall desire any section of any road in such county to be improved, and are or is willing to contribute the whole expense of such improvement, the supervisor of roads of such county shall, upon the written request of such owners or owner, make a plan of such section of road so to be improved, in which shall be given the levels and distances, and also specifications, which shall state the materials that may be used, and the manner of using them; and a copy of such plan, specifications and of any bids to do such work shall then be submitted by such owners or owner to the board of chosen freeholders, and if such board shall approve them, it shall then be lawful for such owners or owner to accept any bid or bids so approved from among the bidders, and proceed to build such section of road according to such plan and specifications, and such owners or owner shall have control of the expenditure of the moneys used to make such improvement, subject to the approval and supervision of the supervisor of such county; and upon the completion of the improvement to the satisfaction of the said supervisor and said board of chosen freeholders, and upon the submission to said board of receipts, showing full payment for materials

Property owners may improve at their own expense.

Bids and specifications received.

Owners to disburse the money.

furnished and work done under the plan and specifications, such section of road so improved shall thereafter be a county road; and the said supervisor shall be paid by the aforesaid owners or owner the sum of ten dollars for making the plan, the sum of five dollars for drawing the specifications, and the sum of five dollars for the supervision of the work, and, in case such supervisor is not a civil engineer and an actual survey is necessary, then such owners or owner, at their or his expense, shall procure a survey which shall be subject to the approval of such supervisor, which survey shall take the place of the plan before mentioned.

Shall be a county road.

Fees allowed.

19. *And be it enacted*, That the act entitled "An act to provide for the more permanent improvement of the public roads of this state," approved the fourteenth day of April, one thousand eight hundred and ninety-two, and all acts supplementary thereto and amendatory thereof, be and the same are hereby repealed; *provided, however*, that this section shall not cause any proceedings for the improvement of any public road or section thereof under the provisions of the act hereby repealed to abate, but such proceedings may be continued under the provisions of this act in the same manner as if they had been commenced hereunder.

General repealer.

Proviso.

20. *And be it enacted*, That this act shall take effect immediately.

Approved March 22d, 1895.

CHAPTER 168.

A Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety five.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Whenever there shall be presented to the board of chosen freeholders of any county in this state any petition by the owners of lands praying the said board to cause any road or section thereof to be improved under the provisions of the act to which this is a supplement, it shall be the duty of such board of chosen freeholders, if they are satisfied that all the provisions and conditions of said act have been met and complied with in and by such petitions, to consider and to determine by a vote of a majority of all the members constituting said board, whether the road or section mentioned in said petition is of sufficient general importance to warrant the expenditure of the county and state money for the improvement thereof; and said board of choosen freeholders is hereby authorized, by a vote of a majority of all the members constituting the said board, to grant the prayer of the said petition or to refuse the same if said board shall be of the opinion that the improvement is not of sufficient public importance or that the expense thereof will be an unnecessary public burden; *provided*, that this act shall in no way affect any proceeding heretofore taken to procure a mandamus in case of petition filed under said act.

2. All acts and parts of acts inconsistent with the provisions of this act be and the same are hereby repealed, and this act shall take effect immediately.

Approved April 14, 1896.

CHAPTER 75.

An Act to amend an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. The eighteenth section of the said act shall be amended so as to read as follows:

18. That if any property-owners or owner along any road in any county of this state which has not been improved or is not undergoing improvement under the previous sections of this act shall desire any section of any road in such county to be improved or to be changed in location and improved, and are or is willing to contribute the whole expense of such improvement, and provided every owner of land upon that part of the road proposed to be vacated under this act shall consent in writing to such vacation, the supervisor of roads of such county shall, upon the written request of such owners or owner, make a plan of such sections of roads so to be improved or changed in location and improved, in which will be given the levels and distances, and also specifications stating the materials that may be used and the manner of using them; and a copy of such plan, location, change of location, specifications and of any bids to do such work shall then be submitted by such owners or owner to the board of chosen freeholders, and if such board shall approve them and any change of location which may be proposed, it shall then be lawful for such owners or owner to accept any bid or bids so approved from among the bidders, or at their own expense to proceed to build such section of road according to such plan, location and specifications, and such owners or owner shall have control of the expenditure of the moneys used to make such improvements, subject to the approval and supervision of the supervisor of such county; and upon the completion of the improvement to the satisfaction of the said supervisor and said board of chosen freeholders, and upon the submission to said board of receipts showing full payment for materials furnished and work done under the plan and specifications, such section of road so improved

shall, if the board of chosen freeholders shall so declare, thereafter be a county road, but otherwise shall remain an ordinary public highway, and any and all portions of any road now existing which may have been rendered unnecessary or be superseded by the new road so constructed shall be vacated and abandoned as a public road without other action or proceedings than the approval of the board of chosen freeholders as hereinbefore provided; and the said supervisor shall be paid by the aforesaid owners or owner the sum of ten dollars for making the plan, the sum of five dollars for drawing the specifications, and the sum of five dollars for the supervision of the work, and in case such supervisor is not a civil engineer and actual survey is necessary, than such owners or owner at their or his expense shall procure a survey which shall be subject to the approval of such supervisor, which survey shall take the place of the plan before mentioned, and shall include all the new roads proposed to be constructed and all the old roads proposed to be abandoned.

Approved March 23, 1896.

CHAPTER CCIII.

An Act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; provided, the said rebate shall not exceed fifty cents for each wheel in use in any one year.

2. *And be it enacted*, That this act shall take effect immediately

Approved March 16, 1893.

CHAPTER CXXXI.

An Act to enable township committees, or the governing bodies of any borough, towns, villages or improvement commissions in towns and villages, or within townships in this state, to pass and enforce their ordinances respecting the use of broad tires on wagons and carts upon their macadamized public streets and to collect the penalty for the violation thereof.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That it shall be lawful for any township committee or other governing body of any borough, town, village or improvement commission to pass all necessary ordinances requiring the use of broad tires, but not more than four inches in width, upon all coal, express, lumber, brick or other draft wagons or carts, carrying fifteen hundred pounds or over, used upon any of the macadamized public streets within the limits of the jurisdiction of said township, borough, town, village or improvement commission, and to enforce the observance of such ordinances by a penalty for the violation thereof by a fine not exceeding twenty dollars for each offense; *provided, however*, that no ordinance or penalty herein authorized shall take effect until six months after the passage and publication in a newspaper circulating in said township, borough, town, village or improvement commission of such ordinance, and shall not be applicable to wagons and carts transiently passing through the limits of said township, borough, town, village or improvement commission and not owned or permanently used therein.

2. *And be it enacted*, That this act shall take effect July first, one thousand eight hundred and ninety-five.

Approved May 1, 1894.

CHAPTER 76.

An Act to amend an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes."

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That section one of an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rabatement of taxes," approved March sixteenth, one thousand eight hundred and ninety-three, which reads as follows:

"1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed fifty cents for each wheel in use in any one year," be and the same is hereby amended so as to read as follows:

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed one dollar for each wheel in use in any one year.

2. That this act shall take effect immediately.

Passed March 24, 1896.

Appendix C.

NEW JERSEY.

1. All road taxes are to be paid in money.

2. The office of overseer of highway is abolished.

3. The roads of a township are placed under the management of the township committee, and money may be raised by township bonds for grading, macadamizing and improving the same; bonds to be authorized by vote at the annual town meeting.

4. Under the County act, the Board of Chosen Freeholders of any county may designate certain roads as county roads, and improve the same by the issue of county bonds; townships to pay one-third of the cost.

5. Under the State Aid Law, whenever the owners of two-thirds of the lands fronting on any public road will undertake to pay one-tenth of the cost of improving such road, the Board of Chosen Freeholders may cause such improvements to be made, the State paying one-third of the cost up to, at present, the limit of $100,000 per year.

Appendix D.

TABLES.

As so many persons interested in the construction of stone roads are continually asking questions about their cost, we enclose a table we have prepared, to show at a glance the number of square yards at different widths in a mile of road; also the cost at different widths and various prices per square yard. Any variations from these prices can be quickly ascertained by adding or subtracting the fractional difference.

SQUARE YARDS IN ONE MILE OF

4	feet in width	2,346⅔ sq. yds.
5	"	2,933⅓ "
6	"	3,520 "
7	"	4,106⅔ "
8	"	4,693⅓ "
9	"	5,280 "
10	"	5,866⅔ "
11	"	6,453⅓ "
12	"	7,013⅓ "
13	"	7,626⅔ "
14	"	8,213⅓ "
15	"	8,800 "
16	"	9,386⅔ "
17	"	9,973⅓ "
18	"	10,560 "
19	"	11,146⅔ "
20	"	11,733⅓ "
21	"	12,320 "
22	"	12,906⅔ "
23	"	13,382⅔ "
24	"	14,080 "

4 feet wide, or	2 346⅔	sq. yds., at	25c.	per yd	$586 66⅔
5 "	2,933⅓	"	"		733 33⅓
6 "	3 520	"	"		880 00
7 "	4,106⅔	"	"		1,026 66⅔
8 "	4,693⅓	"	"		1,173 33⅓
9 "	5,280	"	"		1,320 00
10 "	5,866⅔	"	"		1,466 66⅔
11 "	6,453⅓	"	"		1,613 33⅓
12 "	7 013⅓	"	"		1,753 33⅓
13 "	7 626⅔	"	"		1,906 66⅔
14 "	8,213⅓	"	"		2,053 33⅓
15 "	8 800	"	"		2,200 00
16 "	9 386⅔	"	"		2,346 66⅔
17 "	9,973⅓	"	"		2,493 33⅓
18 "	10 560	"	"		2,640 00
19 "	11,146⅔	"	"		2,786 66⅔
20 "	11,733⅓	"	"		2,933 33⅓
21 "	12,320	"	"		3,080 00
22 "	12 906⅔	"	"		3,226 66⅔
23 "	13,382⅔	"	"		3,345 55⅝
24 "	14,080	"	"		3,520 00

4 feet wide, or	2,346⅔	sq. yds., at	30c.	per yd	$704 00
5 "	2,933⅓	"	"		880 00
6 "	3,520	"	"		1,056 00
7 "	4,106⅔	"	"		1,232 00
8 "	4,693⅓	"	"		1,408 00
9 "	5,280	"	"		1,584 00
10 "	5,866⅔	"	"		1,760 00
11 "	6,453⅓	"	"		1,936 00
12 "	7,013⅓	"	"		2,104 00
13 "	7,626⅔	"	"		2,288 00
14 "	8,213⅓	"	"		2,464 00
15 "	8,800	"	"		2,640 00
16 "	9,386⅔	"	"		2,816 00
17 "	9,973⅓	"	"		2,992 00
18 "	10,560	"	"		3,168 00
19 "	11,146⅔	"	"		3,344 00
20 "	11,733⅓	"	"		3,520 00
21 "	12,320	"	"		3,696 00
22 "	12,906⅔	"	"		3,872 00
23 "	13,382⅔	"	"		4,014 66⅔
24 "	14,080	"	"		4,224 00

4	feet wide, or	2,346⅔	sq. yds., at	35c. per yd	$821 33⅓
5	"	2,933⅓	"	"	1,026 66⅔
6	"	3,520	"	"	1,232 00
7	"	4,106⅔	"	"	1,437 33⅓
8	"	4,693⅓	"	"	1,642 66⅔
9	"	5,280	"	"	1,848 00
10	"	5,866⅔	"	"	2,053 33⅓
11	"	6,453⅓	"	"	2,258 66⅔
12	"	7,013⅓	"	"	2,454 66⅔
13	"	7,626⅔	"	"	2,669 33⅓
14	"	8,213⅓	"	"	2,874 66⅔
15	"	8 800	"	"	3,080 00
16	"	9 386⅔	"	"	3,285 33½
17	"	9,973⅓	"	"	3,490 66⅔
18	"	10,560	"	"	3,696 00
19	"	11,146⅔	"	"	3,901 33⅓
20	"	11,733⅓	"	"	4,106 66⅔
21	"	12 320	"	"	4,312 00
22	"	12,906⅔	"	"	4,517 33⅓
23	"	13,382⅔	"	"	4,683 77⅞
24	"	14,080	"	"	4,928 00

4	feet wide, or	2,346⅔	sq. yds., at	40c. per yd	$938 66⅔
5	"	2,933⅓	"	"	1,173 33⅓
6	"	3,520	"	"	1,408 00
7	"	4,106⅔	"	"	1,642 66⅔
8	"	4,693⅓	"	"	1,877 33⅓
9	"	5,280	"	"	2,112 00
10	"	5,866⅔	"	"	2,346 66⅔
11	"	6,453⅓	"	"	2,581 33⅓
12	"	7,013⅓	"	"	2,805 33⅓
13	"	7,626⅔	"	"	3 050 66⅔
14	"	8,213⅓	"	"	3,285 33⅓
15	"	8,800	"	"	3,520 00
16	"	9,386⅔	"	"	3,754 66⅔
17	"	9,973⅓	"	"	3,989 33⅓
18	"	10,560	"	"	4,224 00
19	"	11,146⅔	"	"	4,458 66⅔
20	"	11,733⅓	"	"	4,693 33⅓
21	"	12,320	"	"	4,928 00
22	"	12,906⅔	"	"	5,162 66⅔
23	"	13,382⅔	"	"	5,352 88⅔
24	"	14,080	"	"	5,632 00

4 feet wide, or	2,346⅔	sq. yds., at	45c. per yd		$1,056 00
5	" 2,933⅓	"	"		1,320 00
6	" 3,520	"	"		1,584 00
7	" 4,106⅔	"	"		1,848 00
8	" 4,693⅓	"	"		2,112 00
9	" 5,280	"	"		2,376 00
10	" 5,866⅔	"	"		2,640 00
11	" 6,453⅓	"	"		2,904 00
12	" 7,013⅓	"	"		3,156 00
13	" 7,626⅔	"	"		3,432 00
14	" 8,213⅓	"	"		3,696 00
15	" 8,800	"	"		3,960 00
16	" 9,386⅔	"	"		4,224 00
17	" 9,973⅓	"	"		4,488 00
18	" 10,560	"	"		4,752 00
19	" 11,146⅔	"	"		5,016 00
20	" 11,733⅓	"	"		5,280 00
21	" 12,320	"	"		5,544 00
22	" 12,906⅔	"	"		5,808 00
23	" 13,382⅔	"	"		6,022 00
24	" 14,080	"	"		6,336 00

4 feet wide, or	2,346⅔	sq. yds., at	50c. per yd		$1,173 33⅓
5	" 2,933⅓	"	"		1,466 66⅔
6	" 3,520	"	"		1,760 00
7	" 4,106⅔	"	"		2,053 33⅓
8	" 4,693⅓	"	"		2,346 66⅔
9	" 5,280	"	"		2,640 00
10	" 5,866⅔	"	"		2,933 33⅓
11	" 6,453⅓	"	"		3,226 66⅔
12	" 7,013⅓	"	"		3,506 66⅔
13	" 7,626⅔	"	"		3,813 33⅓
14	" 8,213⅓	"	"		4,106 66⅔
15	" 8,800	"	"		4,400 00
16	" 9,386⅔	"	"		4,693 33⅓
17	" 9,973⅓	"	"		4,986 66⅔
18	" 10,560	"	"		5,280 00
19	" 11,146⅔	"	"		5,573 33⅓
20	" 11,733⅓	"	"		5,866 66⅔
21	" 12,320	"	"		6,160 00
22	" 12,906⅔	"	"		6,453 33⅓
23	" 13,382⅔	"	"		6,691 11⅑
24	" 14,080	"	"		7,040 00

4 feet wide, or 2,346⅔ sq yds., at 55c. per yd					$1,290 66⅔
5	"	2,933⅓	"	"	1,613 33⅓
6	"	3,520	"	"	1,936 00
7	"	4,106⅔	"	"	2 258 66⅔
8	"	4,693⅓	"	"	2 581 33⅓
9	"	5,280	"	"	2,904 00
10	"	5,866⅔	"	"	3 226 66⅔
11	"	6,453⅓	"	"	3,549 33⅓
12	"	7,013⅓	"	"	3,856 33⅓
13	"	7,626⅔	"	"	4 194 66⅔
14	"	8,213⅓	"	"	4 517 33⅓
15	"	8,800	"	"	4 840 00
16	"	9,386⅔	"	"	5 162 66⅔
17	"	9,973⅓	"	"	5,485 33⅓
18	"	10,560	"	"	5,808 00
19	"	11,146⅔	"	"	6,130 66⅔
20	"	11,733⅓	"	"	6 453 33⅓
21	"	12,320	"	"	6,776 00
22	"	12,906⅔	"	"	7,098 66⅔
23	"	13 382⅔	"	"	7,360 22⅔
24	"	14,080	"	"	7,744 00

4 feet wide, or 2,346⅔ sq. yds., at 60c. per yd					$1,408 00
5	"	2,933⅓	"	"	1 760 00
6	"	3,520	"	"	2,112 00
7	"	4,106⅔	"	"	2,464 00
8	"	4,693⅓	"	"	2,816 00
9	"	5 280	"	"	3,168 00
10	"	5,866⅔	"	"	3,520 00
11	"	6,453⅓	"	"	3,872 00
12	"	7,013⅓	"	"	4,208 00
13	"	7,626⅔	"	"	4,576 00
14	"	8,213⅓	"	"	4,928 00
15	"	8,800	"	"	5,280 00
16	"	9,386⅔	"	"	5,632 00
17	"	9,973⅓	"	"	5,984 00
18	"	10,560	"	"	6,336 00
19	"	11,146⅔	"	"	6,688 00
20	"	11,733⅓	"	"	7,040 00
21	"	12,320	"	"	7,392 00
22	"	12,906⅔	"	"	7,744 00
23	"	13,382⅔	"	"	8,029 33⅓
24	"	14,080	"	"	8,448 00

4 feet wide, or 2,346⅔ sq. yds., at 65c. per yd					$1,525 33⅓
5	"	2,933⅓	"	"	1,906 66⅔
6	"	3,520	"	"	2,288 00
7	"	4,106⅔	"	"	2,669 33⅓
8	"	4,693⅓	"	"	3,050 66⅔
9	"	5,280	"	"	3,432 00
10	"	5,866⅔	"	"	3,813 33⅓
11	"	6,453⅓	"	"	4,094 66⅔
12	"	7,013⅓	"	"	4,558 66⅔
13	"	7,626⅔	"	"	4,957 33⅓
14	"	8,213⅓	"	"	5,338 66⅔
15	"	8,800	"	"	5,720 00
16	"	9,386⅔	"	"	6,101 33⅓
17	"	9,973⅓	"	"	6,482 66⅔
18	"	10,560	"	"	6,864 00
19	"	11,146⅔	"	"	7 245 33⅓
20	"	11,733⅓	"	"	7,626 66⅔
21	"	12,320	"	"	8 008 00
22	"	12,906⅔	"	"	8 389 33⅓
23	"	13,382⅔	"	"	8,698 43⅓
24	"	14,080	"	"	9,152 00

4 feet wide, or 2,346⅔ sq. yds., at 70c. per yd					$1 642 66⅔
5	"	2,933⅓	"	"	2,053 33⅓
6	"	3,520	"	"	2,464 00
7	"	4,106⅔	"	"	2,874 66⅔
8	"	4,693⅓	"	"	3 285 33⅓
9	"	5,280	"	"	3 696 00
10	"	5,866⅔	"	"	4 106 66⅔
11	"	6,453⅓	"	"	4 517 33⅓
12	"	7,013⅓	"	"	4 909 33⅓
13	"	7,626⅔	"	"	5 338 66⅔
14	"	8,213⅓	"	"	5,749 33⅓
15	"	8,800	"	"	6,160 00
16	"	9,386⅔	"	"	6,570 66⅔
17	"	9,973⅓	"	"	6 981 33⅓
18	"	10,560	"	"	7,392 00
19	"	11,146⅔	"	"	7,802 66⅔
20	"	11,733⅓	"	"	8,213 33⅓
21	"	12,320	"	"	8,624 00
22	"	12,906⅔	"	"	9,034 66⅔
23	"	13,382⅔	"	"	9,367 55⅝
24	"	14,080	"	"	9,856 00

4 feet wide, or	2,346⅔	sq. yds., at	75c.	per yd	$1,760 00
5	"	2,933⅓	"	"	2,200 00
6	"	3,520	"	"	2,640 00
7	"	4,106⅔	"	"	3,080 00
8	"	4,693⅓	"	"	3,520 00
9	"	5,280	"	"	3,760 00
10	"	5,866⅔	"	"	4,400 00
11	"	6,453⅓	"	"	4,840 00
12	"	7,013⅓	"	"	5,260 00
13	"	7,626⅔	"	"	5,720 00
14	"	8,213⅓	"	"	6,160 00
15	"	8,800	"	"	6,600 00
16	"	9,386⅔	"	"	7,038 00
17	"	9,973⅓	"	"	7,480 00
18	"	10,560	"	"	7,920 00
19	"	11,146⅔	"	"	8,360 00
20	"	11,733⅓	"	"	8,800 00
21	"	12,320	"	"	9,240 00
22	"	12,906⅔	"	"	9,680 00
23	"	13,382⅔	"	"	10,036 66⅔
24	"	14,080	"	"	10,560 00

4 feet wide, or	2,346⅔	sq. yds., at	80c.	per yd	$1,877 33⅓
5	"	2,933⅓	"	"	2,346 66⅔
6	"	3,520	"	"	2,816 00
7	"	4,106⅔	"	"	3,285 33⅓
8	"	4 693⅓	"	"	4,154 66⅔
9	"	5,280	"	"	4,224 00
10	"	5,866⅔	"	"	4,693 33⅓
11	"	6,453⅓	"	"	5,202 66⅔
12	"	7,013⅓	"	"	5,610 66⅔
13	"	7,626⅔	"	"	6,101 33⅓
14	"	8,213⅓	"	"	6,570 66⅔
15	"	8,800	"	"	7,040 00
16	"	9,386⅔	"	"	7,509 33⅓
17	"	9,973⅓	"	"	7,978 66⅔
18	"	10,560	"	"	8,448 00
19	"	11,146⅔	"	"	8,917 33⅓
20	"	11,733⅓	"	"	9,386 66⅔
21	"	12 320	"	"	9,856 00
22	"	12,906⅔	"	"	10,325 33⅓
23	"	13,382⅔	"	"	10,705 77⅞
24	"	14,080	"	"	11,264 00

4 feet wide, or 2,346⅔	sq. yds., at 85c. per yd			$1,994	66⅔
5	" 2,933⅓	"	"	2,493	33⅓
6	" 3,520	"	"	2,992	00
7	" 4,106⅔	"	"	3,490	66⅔
8	" 4,693⅓	"	"	3,989	33⅓
9	" 5,280	"	"	4,488	00
10	" 5,866⅔	"	"	4,986	66⅔
11	" 6,453⅓	"	"	5,485	33⅓
12	" 7,013⅓	"	"	5,961	33⅓
13	" 7,626⅔	"	"	6,482	66⅔
14	" 8,213⅓	"	"	6,981	33⅓
15	" 8,800	"	"	7,480	00
16	" 9,386⅔	"	"	7,978	66⅔
17	" 9,973⅓	"	"	8,477	33⅓
18	" 10,560	"	"	8,976	00
19	" 11,146⅔	"	"	9,474	66⅔
20	" 11,733⅓	"	"	9,973	33⅓
21	" 12,320	"	"	10,472	00
22	" 12,906⅔	"	"	10,970	66⅔
23	" 13,382⅔	"	"	11,374	88⅔
24	" 14,080	"	"	11,968	00

4 feet wide, or 2,346⅔	sq. yds., at 90c. per yd			$2,112	00
5	" 2,933⅓	"	"	2,640	00
6	" 3,520	"	"	3,168	00
7	" 4,106⅔	"	"	3,696	00
8	" 4,693⅓	"	"	4 224	00
9	" 5,280	"	"	4,752	00
10	" 5,866⅔	"	"	5,280	00
11	" 6,453⅓	"	"	5,808	00
12	" 7,013⅓	"	"	6,312	00
13	" 7,626⅔	"	"	6,864	00
14	" 8,213⅓	"	"	7,392	00
15	" 8 800	"	"	7,920	00
16	" 9,386⅔	"	"	8,448	00
17	" 9,973⅓	"	"	8,976	00
18	" 10,560	"	"	9,504	00
19	" 11,146⅔	"	"	10 032	00
20	" 11,733⅓	"	"	10,560	00
21	" 12 320	"	"	11,088	00
22	" 12 906⅔	"	"	11,616	00
23	" 13 382⅔	"	"	12,044	00
24	" 14,080	"	"	12,672	00

4 feet wide, or	2,346⅔	sq. yds., at	95c.	per yd	$2,229 33⅓
5	"	2,933⅓	"	"	2,786 66⅔
6	"	3,520	"	"	3 344 00
7	"	4,106⅔	"	"	3,901 33⅓
8	"	4,693⅓	"	"	4,458 66⅔
9	"	5,280	"	"	5,016 00
10	"	5,866⅔	"	"	5,573 33⅓
11	"	6,453⅓	"	"	6,130 66⅔
12	"	7,013⅓	"	"	6,662 66⅔
13	"	7,626⅔	"	"	7,245 33⅓
14	"	8,213⅓	"	"	7,802 66⅔
15	"	8,800	"	"	8,360 00
16	"	9,386⅔	"	"	8,917 33⅓
17	"	9,973⅓	"	"	9,474 66⅔
18	"	10,560	"	"	10,032 00
19	"	11,146⅔	"	"	10,589 33⅓
20	"	11,733⅓	"	"	11,146 66⅔
21	"	12,320	"	"	11,704 00
22	"	12,906⅔	"	"	12 261 33⅓
23	"	13,382⅔	"	"	12,713 11⅑
24	"	14,080	"	"	13,376 00

4 feet wide, or	2,346⅔	sq. yds., at	$1.00	per yd	$2,346 66⅔
5	"	2,933⅓	"	"	2,933 33⅓
6	"	3,520	"	"	3,520 00
7	"	4,106⅔	"	"	4,106 66⅔
8	"	4,693⅓	"	"	4,693 33⅓
9	"	5,280	"	"	5,280 00
10	"	5,866⅔	"	"	5,866 66⅔
11	"	6,453⅓	"	"	6,453 33⅓
12	"	7,013⅓	"	"	7,013 33⅓
13	"	7,626⅔	"	"	7,626 66⅔
14	"	8,213⅓	"	"	8.213 33⅓
15	"	8,800	"	"	8,800 00
16	"	9,386⅔	"	"	9,386 66⅔
17	"	9,973⅓	"	"	9,973 33⅓
18	"	10 560	"	"	10,560 00
19	"	11,146⅔	"	"	11 146 66⅔
20	"	11,733⅓	"	"	11,733 33⅓
21	"	12,320	"	"	12,320 00
22	"	12,906⅔	"	"	12,906 66⅔
23	"	13,382⅔	"	"	13,382 22⅔
24	"	14,080	"	"	14,080 00

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